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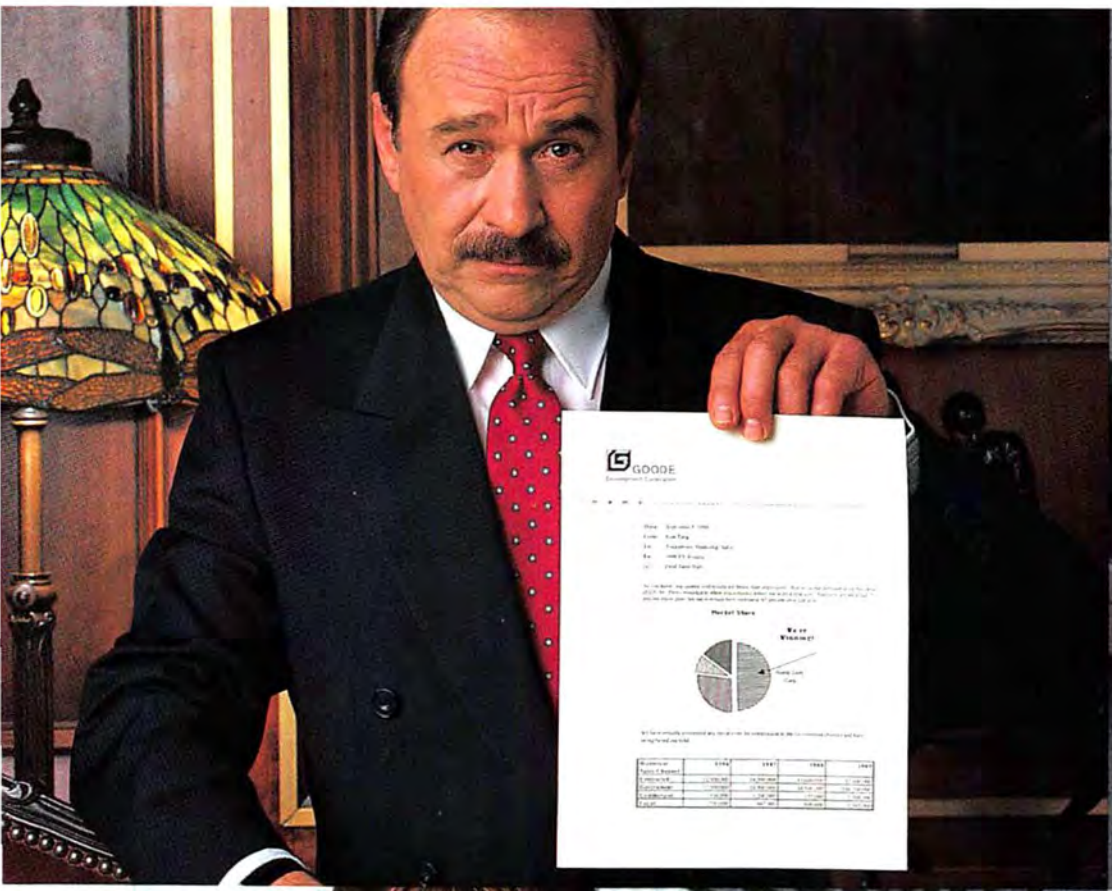
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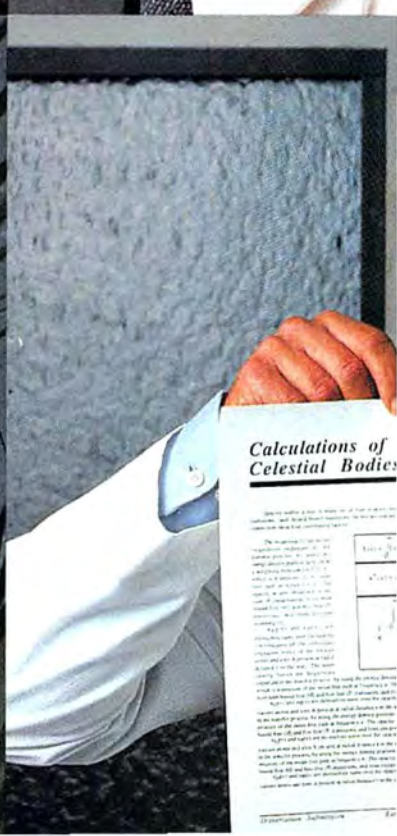
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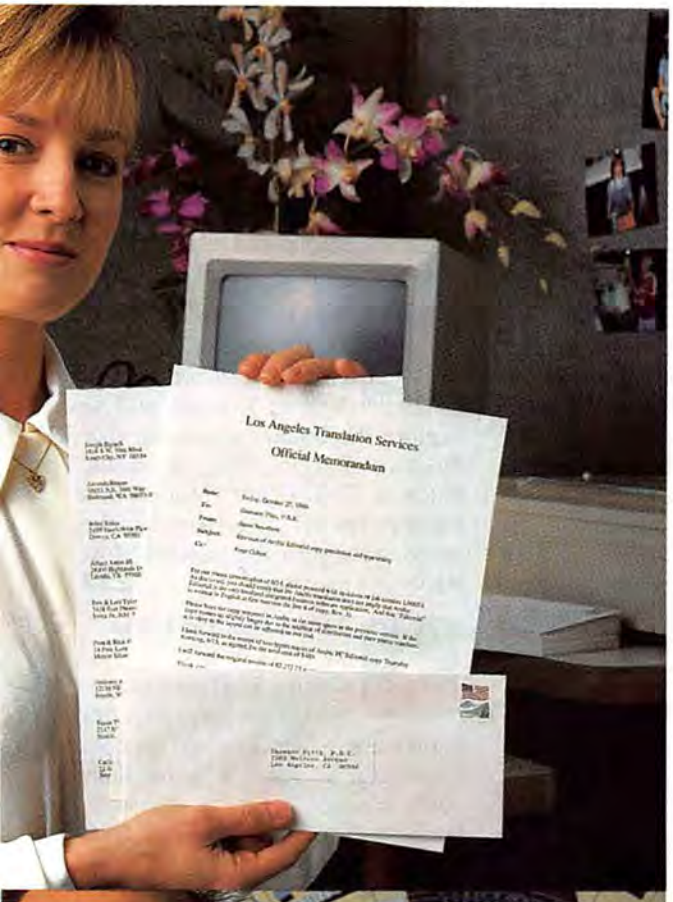


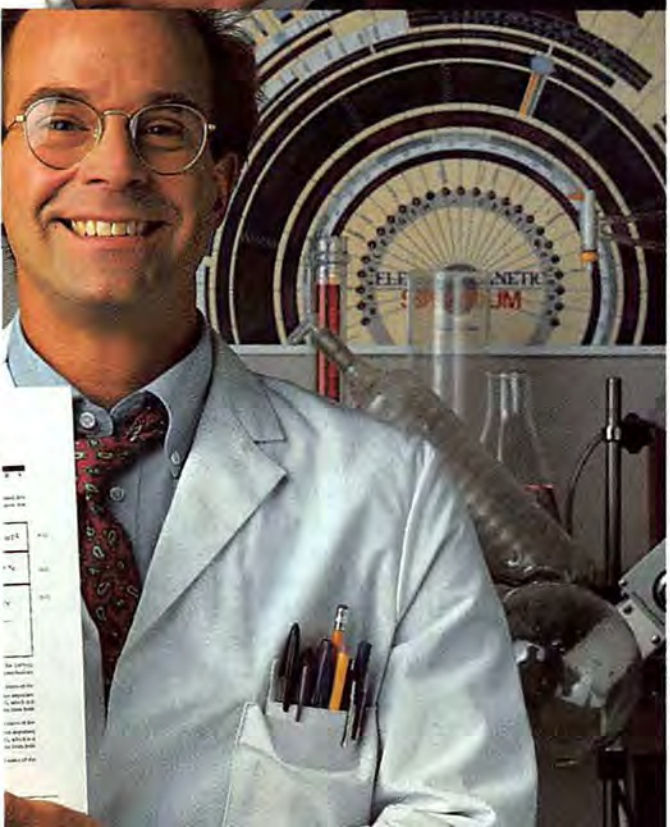






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MacUser

StartUp



News **44**
Thumb along, with Guy Kawasaki's rules of thumb to guide your way through the challenges of being a Mac user. Plus the latest industry news, rumors, updates, reviews of the hottest new products, and more.

Bobker's Dozen **46**
BY STEVEN BOBKER
No-nonsense looks at 13 hot products: **SAM 2.0** upgrades its attack on new viruses. **Remote/WakeUp** lets you turn your Mac on and off from afar. **Page Designs Quick!** provides PDQ! PageMaker templates for newspaper publishing. **Comic People, Volume 2: Kids Stuff** proves that comics aren't just for kids. **Electric Dvorak** is the best QWERTY alternative around. **Cat•Back** can catalog and back up your hard disk. **AutoBack** is good insurance for the lazy. **Mac Envelopes Plus** is the best envelope and mailing-list program you can buy. **Take Control of Cholesterol** helps you improve your health. **Igor** lets you analyze data visually — without dwarfs and lightning bolts. **Nuts & HyperBolts** brings HyperCard and grammar together. **SecureInit** can keep your Mac's data safe from prying eyes. **Balance of the Planet** gives you a chance to solve the world's environmental problems.

Reviews **55**
Radius Pivot: Radius' combination portrait and landscape monitor is a turn for the better. **55**
On Location: Find files and text fragments on a hard disk, CD-ROM disc, or network — fast! **57**
MacProof and **RightWriter:** A pair of new electronic Strunk and Whites challenge Correct Grammar, the reigning champion. **59**
TScript: A no-frills, low-cost PostScript clone that makes non-PostScript printers PostScript-compatible — sort of. **62**
Radius QuickCAD Graphics Engine: Designed for display-list CAD software, this NuBus card increases the Mac's redraw speed. **64**
CheckFree: Electronic bill paying via Mac and modem goes on-line. **68**
Accountant, Inc. Professional: A new integrated accounting package uses on-screen forms that look like the documents you already use. **75**
Practica Musica and **Harmony Grid:** Used together, these two music programs offer an excellent balance of theory and experimentation. **77**



Power Tools

Six PostScript Tricks for Word Processors
BY GREGORY WASSON
If you have access to a PostScript printer and can type a few short routines into your word-processing program, you can have an instant library of special printing effects. **230**

Beating the System
BY MICHAEL SWAINE
Experience a live demo of System 7. Learn how to explore the hidden world on your disks with ResEdit, DiskTop, and the hot new Disk Editor from Norton Utilities for the Mac. And see the amazing answer to the question "How heavy is a megabyte?" **237**

The Expert's Edge
BY THOM HOGAN
Getting SCSI devices connected properly requires knowledge, patience — and voodoo. Especially as Apple's instructions don't always work. Fortunately, Hogan's instructions do. **243**

Power Programming
BY KURT W. G. MATTHIES AND THOM HOGAN
What application programmers need to know about Mac memory when they're debugging C code. **259**

Tip Sheet
COMPILED BY GREGORY WASSON
Readers send us their favorite tips, tricks, and undocumented features for Word, the Finder, MultiFinder, PageMaker, WriteNow, Excel, SimCity, and more. **268**

Help Folder
BY BOB LEVITUS
The Doctor is in (Dr. Macintosh, that is), and he's got the prescriptions for curing ADB-port trauma, foreign-language-dictionary dysfunction, Microsoft Windows anxiety, and other Mac maladies. **283**

AUGUST 1990
VOLUME 6
NUMBER 8

Bonus Buyer's Guide

MiniFinders
Our directory of more than 500 concise product reviews and ratings is an indispensable reference for helping you find and evaluate every category of Mac hardware and software. **133**

Solutions



The Elements of Auto-Tracing
BY SALVATORE PARASCANDOLO
Here's how to get a head start on great line art — all you need is an auto-tracing program, the right techniques, and a little patience.... **206**

Capturing Font Outlines
BY GREGORY WASSON
Nine useful ways to create editable outlines of your favorite fonts. **210**

Creating Dynamic Maps
BY THE EDITORS OF *VERBUM* MAGAZINE
A step-by-step guide to producing topographical PostScript illustrations with bit-mapped textures and layers of color. **214**

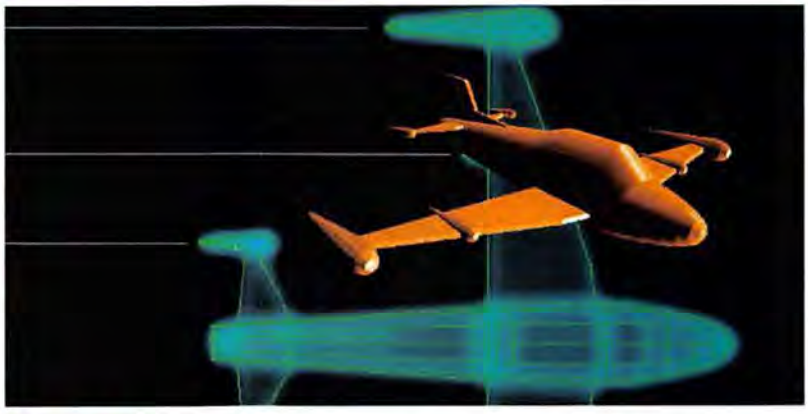


Currents
Mac-based Ethernet at PC-competitive prices, the token-ring explosion, routers in software, a new fax gateway, and a portable modem that plugs into your ADB port. **216**

From Here to There and Back Again
BY STEPHAN SOMOGYI
Laplink Mac III gives you a great way to move files between your Mac and your PC laptop — or even between two Macs. **219**

Networks: Under New Management
BY JOHN RIZZO
Performing surgery on your network is about to get easier, thanks to a host of new network-management hardware and software, including Network Manager's Toolkit and StatusMac. **226**

MacUser Labs



MacUser LABS

Chasing the IIfx: Accelerators
BY WINN L. ROSCH AND THE MACUSER LABS STAFF
MacUser Labs tests 30 ways to shift your Mac into high gear. Apple's new hyperfast flagship, the IIfx, has redefined the peak of Mac performance. But a dozen manufacturers offer ways to improve your Mac's speed, whether you have a humble Plus or the former champion speedster, the IIci. Our comprehensive benchmarks guide you through the labyrinth of options, from accelerator boards to CPU upgrades, to help you find the perfect balance of price and performance that fits your need for speed — and your budget. ... **84**



Mac CAD Takes Off
BY PHILLIP ROBINSON
Computer-aided design on the Mac moves into the mainstream with some trailblazing new ideas in artificially intelligent drafting assistance, 3-D design, groupware, and specialized CAD applications. We help you evaluate dozens of CAD choices, including Autodesk's AutoCAD, Engineered Software's PowerDraw 3.0, Ashlar's Vellum, Intergraph's MicroStation, and more. **114**

Advertiser Index **302**
Marketplace **309**

Cover by Lisa Orsini

Opinion

Paul Somerson
Windows of opportunity. **25**

Robert R. Wiggins
Ten tips for making great presentations. **29**

Guy Kawasaki
Here's how the *real* pros evangelize. **41**

John C. Dvorak
Voice recognition and other duds. **328**

Letters
Readers GACJ (Gripe About Computer Jargon), reveal the secrets of their true-life file-rescue tales, and get all topsy-turvey about the programmer's switch. **11**

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and
Derek Van Alstyne
1967 – 1989

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Technical Difficulties and Help

Although we can't offer any telephone assistance, *MacUser* welcomes your technical questions. If you've got a Mac question or problem, send it to Help Folder, c/o *MacUser*, 950 Tower Lane, 18th Floor, Foster City, CA 94404. If we can't give you an answer, we'll find someone who can. Because of the volume of mail we receive, we can't answer all your questions, so we also recommend that you take advantage of your local user groups. You can find the one nearest you by calling Apple toll-free at (800) 538-9696, ext. 500.

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We love to get tips and hints (on a disk, please) from our readers. Any tips should be sent to Tip Sheet, c/o *MacUser*, 950 Tower Lane, 18th Floor, Foster City, CA 94404. We can't print every tip, but we try our best to pick the most interesting and representative ones for publication. We'd also like to hear from any programmers who are interested in contributing to our utilities disk series or labs-benchmark disk series. If you're interested, contact Michele Stokol at the address above.

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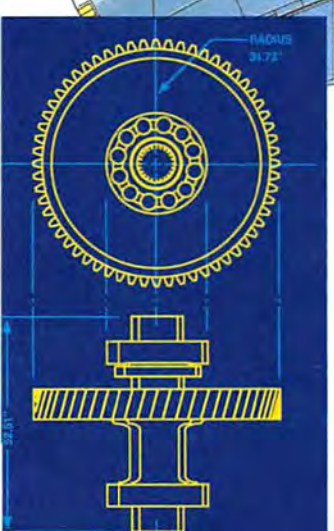
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About MacUser

Splitting Hairs over Split Seconds

A product-testing lab is more than just a few Macs parked on a workbench. You also need a team of talented technologists to make sense of a sea of benchmark results. For this month's massive accelerator-comparison test, senior project leader Jeff Pittelkau led a seven-person group through more than a thousand hours of research, product acquisition, testing, and analysis.

The behind-the-scenes effort that went into creating a meaningful test setup was mind-boggling. Testing these lightning-fast accelerator boards required months of meticulous and methodical planning; after all, accurately measuring split-second differences among accelerators is no mean feat. Subtle technical distinctions that could easily be dismissed as nit-picking and hairsplitting can make all the difference in the fast-paced world of accelerators.



MacUser Labs' Jeff Pittelkau spent countless hours finding out exactly how many seconds you can save with an accelerator board.

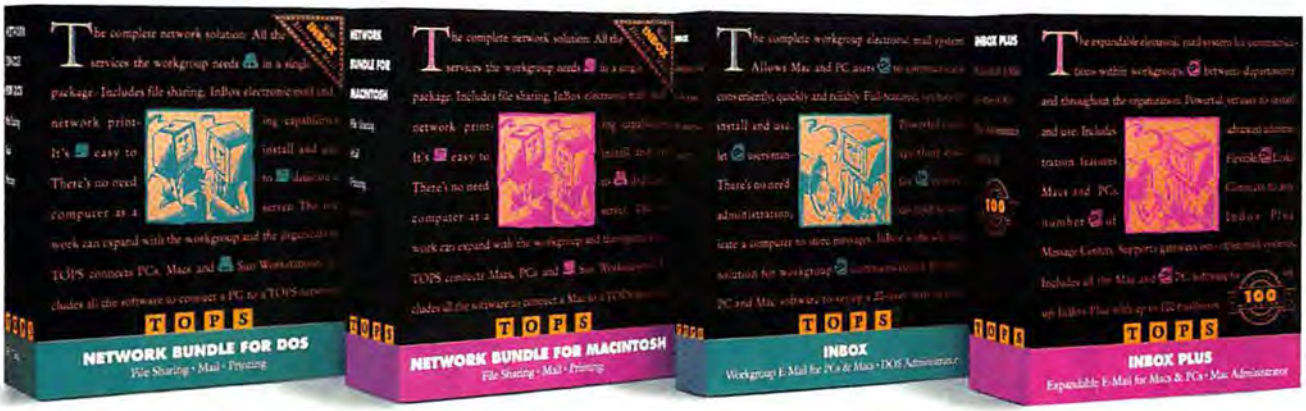
In our test setup, every aspect of performance was rigorously controlled. "We had to assemble a set of CPUs with the latest — and identical — ROM version," says Pittelkau. "Then we had to round up identical hard-disk drives to use in testing. FWB's generous loan of five matched PocketHammer drives let us run four test stations concurrently and keep a 'golden' source disk."

After the design phase had been locked in, the actual testing and interpretation were even more challenging. Although engineers may grasp the significance of conventional — but abstract — Whetstone and Dhrystone tests, our aim was to develop a test suite directly applicable to normal business applications and to transform the resulting data into graphs that looked simple.

For example, we added disk-intensive tests that revealed accelerators in their worst light. Although this approach may not please accelerator manufacturers, we knew you'd want to see what accelerators do for everyday needs such as file duplication, application launching, and disk-churning accounting tasks (not much) as well as how they perform in CPU-intensive tasks such as spreadsheet recalculations or CAD surface rendering (where they really shine). We also created a unique QuickDraw benchmark to make the raw-performance chart — one more example of our ceaseless efforts to keep bringing you the kind of accurate, head-on comparison data you need to make critical and informed buying decisions.

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LETTERS

COMPILED BY JAMES BRADBURY

SUM Totaled

I recently had an interesting experience while trying to reclaim documents on a bad floppy disk. Using SUM II, I went through the normal routine and brought back all the lost documents. However, the one I really wanted — a 25-page document our intern had been working on in Microsoft Word — had some sort of file error that SUM II couldn't get past.

I called Symantec's technical support and was told that SUM II had little success in retrieving Word documents! Specifically, if you're working on a Word document when a problem occurs, you can forget it.

So I gave our intern my condolences. Still, it nagged at me until I went back and found the article in the February '90 issue on file recovery ("Hard-Disk- and File-Recovery Methods," page 240). And there was the answer I needed: "PageMaker is a great program for recovering damaged MacWrite and Word files." I tried it, and it worked like a charm.

Thanks for putting out such a great magazine. It's proved its worth to me many times over, this being only the latest example.

Connie Mahan
Washington, DC

Topsy-Turvy Switch

Thanks for the wonderful tip in the Help Folder regarding the programmer's switch ("He'd Rather Fight than Switch," May '90, page 339). But the illustration accompanying the tip is wrong, at least for the Mac SE. You've got the switch upside down, and therefore the relative positions of the interrupt and reset switches are reversed. If I tried to install my switch your way, it would break.

Lest you think I'm really bright, though, after I saw your illustration, I immediately popped my switch off (where it had been working fine for two years) and tried to turn it upside down per your drawing. Oh well.

James E. Trudeau
Cumberland Center, ME

As you discovered, Apple designed the interrupt switches for the SE series and the II series so that they're completely incompatible, installed on different sides of the machine, and pointing in different directions.

Our illustration shows a Mac II and is correct for that machine plus its cousins the IIx and IIfx (the IIci and IIcx have a completely different switch that's permanently mounted on the front of the machine). To see how the programmer's switch should look when correctly installed on an SE, just turn your magazine upside down. — JB

ILLUSTRATION: MARY POWER



TORUCJ? Ben Long of San Francisco, California, is (Tired of Reading Useless Computer Jargon, that is): "I have yet to see an article or ad that uses the term WYSIWYG without defining it. It's stupid to use an acronym that you feel you have to explain. AAAIDSASBYHTAIADWI (As an Acronym It Doesn't Save Any Space Because You Have to Always Include a Disclaimer with It). Not to mention a guide to pronunciation." Sorry, Ben, we'd have gotten back to you sooner, but you didn't include an SASE.

It's Works for Him

Enough is enough! Everybody who writes a review on word processing, flat-file databases, spreadsheet programs, and communications programs mentions Microsoft Works. Everyone always says it's an OK program but that it's entry-level. This is simply ludicrous. Programs such as Works have been able to handle my personal and business needs. I hope that the editors of *MacUser* open their minds to the fact that all programs don't have to cost a lot to be good.

Joseph J. Gudac, Jr.
Uniontown, PA

You're right. Works is probably the most underappreciated program for the Mac today. We haven't entirely overlooked it, though—there's an article coming soon that shows you how to make Works work even better. — JB

Something for Nothing

Last September an article appeared in *Chicago Computing* about a device called the Converter, which is essentially a precision hole punch designed to produce the extra hole in a floppy-disk case that allows the Mac to format and run the disk as a 1.44-megabyte high-density disk. The writer argued that the significant differences between double-density and high-density disks lay in two technical specifications, called *signal return* and *coercivity*, and that these factors vary more *among* manufacturers than between the double-density and high-density disk made by any *one* manufacturer.

This argument sounds reasonable to me, but I don't have

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LETTERS

the expertise to evaluate it. What do you make of his claims? If he's wrong, I guess my Converter goes into the trash.

Donald T. Dryden
Chicago, IL

Wasn't it P. T. Barnum who said, "There's a high-density disk born every minute"? The only thing I'd trust to store on a disk that was modified in this way is data that I never wanted to see again — and a magnet works just as well for that. Sorry, but I recommend the trash. — SS

Special Delivery . . .

. . . Response to our Reader Survey of last May has been enthusiastic, and the mailbags are still coming. We'll be presenting some of the official results as soon as we finish drawing straws to see who gets to collate them. In the meantime, here's an unscientific sampling of advice for Apple:

Now that I've learned to work better and faster with my IIx, I consider my Mac to be as important as my pen. I want to be able to carry my pen with the same power anywhere I go. That's the problem with the Mac. Apple brought me to this point, and now it has stopped following my needs. I'm waiting to buy that pen!
Raymond Touchiette
Boucherville, Quebec, Canada

IBM has finally caught up with the GUI of the Mac. But Apple has been complacent. Apple needs to do something big.
James Wurster
Conshohocke, PA

Apple must reestablish its vision.
Dana Swift
Tulsa, OK

Concentrate on low-end computers to get a Mac in every home.
Craig Gholston
Belmont, CA

High CPU prices will kill Apple eventually. It should move faster and raise the hacker spirit again. Apple should advertise based on interface superiority, not just hardware speed.
Ramon Perez Gatell
Estancias San Fernando, Puerto Rico

Does Apple expect to increase market share against DOS-compatible machines? Lower prices, and then license the Macintosh ROMs. If IBM and Microsoft had not done this already, the prices of IBM machines would have prohibited IBM and compatibles from becoming the office "standard."
Timothy R. Kelly
Omaha, NE

Don't be afraid to "continuously improve" mature products — for example, a Plus with 2 megabytes of RAM and a SuperDrive. Such evolutionary products *are* priceable.
I. L. Deters
Rochester Hills, MI

Get out of the font business!
Maureen S. Donahue
Santa Clara, CA

Apple should remember that old computer chestnut, as it comes from its customers: "Without us, you are nothing." How can Apple hope to retain customer loyalty when it expects us to interface with it through certified Apple dealers with I/O problems?
Irene Bensinger
Lancaster, CA

Do something about INITs, quickly!
J. Vallot
Pontoise, France

PostScript clones will make a difference if Apple ever licences its ROMS. Mac clones will encourage third-party hardware sales all around.
Julie Steding
Portland, OR

Speak Up: What's the marketing slogan for Apple in the '90s?

Apple's almost as famous for slogans as for computers. People still refer to "The Computer for the Rest of Us," and Apple's gotten plenty of mileage out of "The Power to Be Your Best." Of course, not all of its slogans were so inspired. Remember the punch line from the infamous helocar campaign? Don't feel bad, neither do we. Maybe it's time for Apple to come up with some new ideas.

Send your thoughts to Special Delivery, c/o *MacUser*, 950 Tower Lane, 18th Floor, Foster City, CA 94404.

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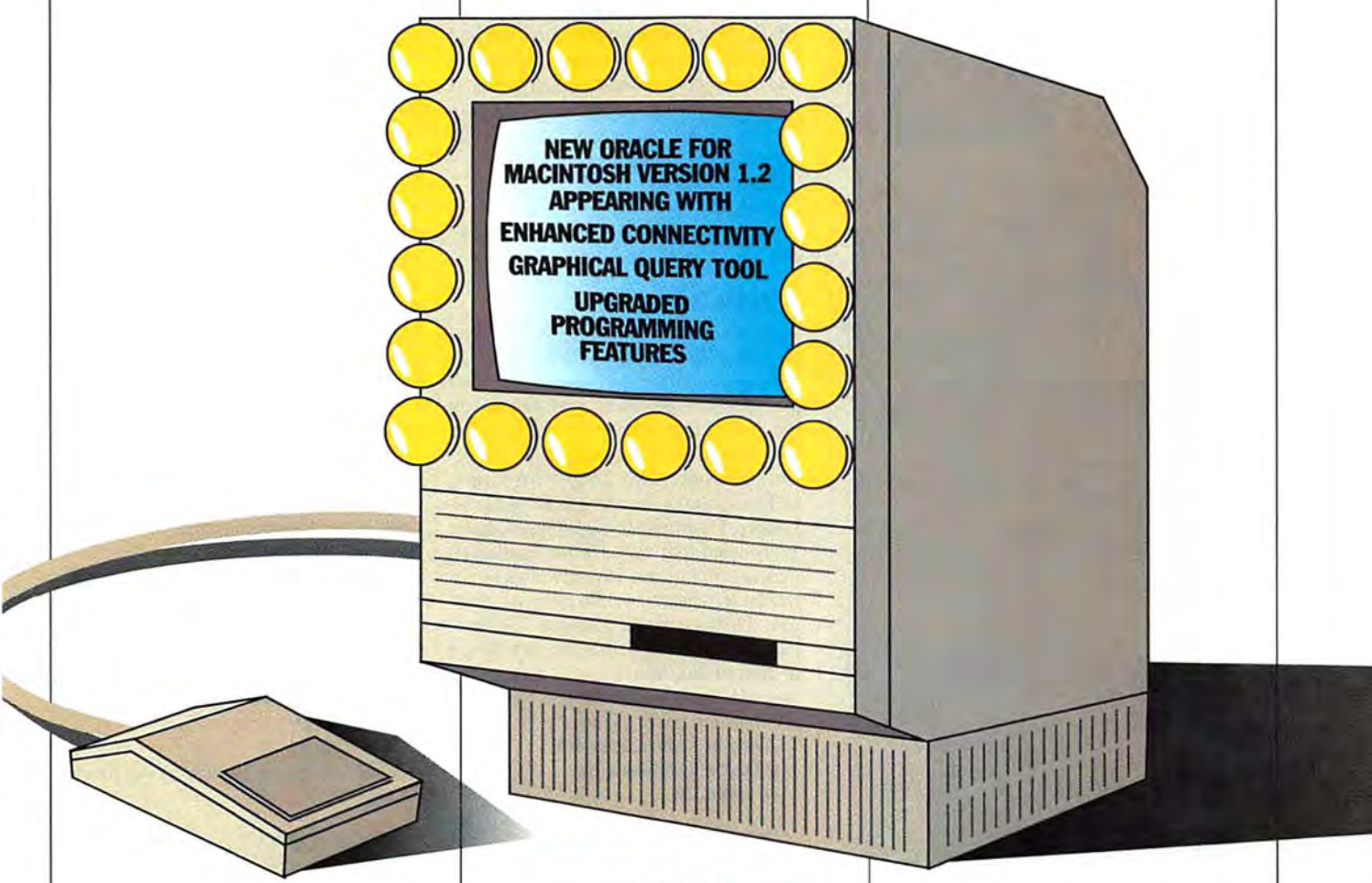
The new HyperCard-based Query Tool, with the enhanced Application Generator and System Stack, lets users point and click to query data and then automatically transfer it to their favorite programs such as Excel, Wingz or Word. All without knowing SQL or writing code.

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LETTERS

New ResMENU

In the May issue of *MacUser*, I noticed that my program ResMENU was mentioned in an article on editing menus ("Creating Resources and Menus," page 331). The article referred to an older version of the program, and I'd like to let your readers know that a new version (fully compatible with ResEdit 1.2) is now available. You can get it by sending a blank formatted disk *and* return postage to Alan T. Goates, OtherWare, 2055 Parley's Canyon Blvd., Salt Lake City, UT 84109.

Alan T. Goates
Salt Lake City, UT

Revenge of the Nerds

I look to your magazine for advice on what is the best in the Mac world, but I would like to comment on "The Mac IIfx: Fast Times at Apple Computer" by Russell Ito and John Rizzo (May '90, page 114). They stated as a fact, "Only nerds love UNIX." I believe this is their opinion and not a fact. I have met many UNIX users and would not call most of them nerds. If this statement were made at a UNIX convention, I believe you'd find it to be untrue of many of the people there.

Sherri K. Harms
Hays, KS

Sorry, no offense intended. Some of our best friends are nerds. — JB

Off the Critical List

Thank you for publishing "Critical Accounts" by Ken Landis (May '90, page 156). Accounting software is difficult and time-consuming to evaluate. Given the limited time a reviewer has to spend with a program, I fully appreciate the effort and results of Mr. Landis' hard work.

The synopsis for our products MultiLedger, CashLedger, and Payroll, however, noted that we have no transaction journals. In fact, we have always categorized our transactions into five main journals: Disbursements, Receipts, General, Payables, and Sales. In addition to being in the journals, transactions for the entire year are listed in the General Ledger in account-number sequence.

James M. Mathre, President
CheckMark Software, Inc.
Ft. Collins, CO

Powerful Support

I am writing to commend the support provided by Power Up! Software. After installing its Address Book Plus, I found the program wouldn't print on my Ricoh PC Laser 6000/PS. I called Power Up! support. During two conversations, the principal author of the program, Kevin Jones, spent almost two hours leading me through the solution to my problem. It turned out the problem was in my system software and not in the Power Up! program. Two hours of telephone support — Power Up! called me — for a program that cost less than $50 is no way to make money. But it sure builds good will!

Edward Ashworth
Lafayette, LA

Plenum of Nothin'

Your "Star Wars" article on networking (May '90, page 186) was very useful, but the author is mistaken regarding plenum wire. Plenum is not "a special coating that doesn't produce poisonous gases when burned." The air space above a hung ceiling is a "plenum" when it's used as the return air duct for a heating or air-conditioning system. Conditioned air flows through ducts in the ceiling and out into the room, and the "return" air goes back through the plenum (saving the cost of separate return ducts).

Fire officials have discovered that the air flow in plenums encourages the spread of fire along anything in the plenum that's flammable, including normal PVC wire insulation. "Plenum cable" is shorthand for "plenum-rated cable," and it signifies that the wire has passed a special test for fire resistance, flame spread, and low smoke generation. The insulation on plenum-rated wire is made of material such as Teflon or Halar, and it usually costs two to ten times more than normal cable. However, the installed cost of plenum-rated cable is usually lower than the alternative, which is to put cheap cable into metal conduit wherever it passes through a plenum.

The author is correct — always check building codes before installing cabling. And check the ceiling too — you may have a ducted return system, in which case the ceiling is *not* a plenum and it *may* be legal to use less-expensive cable.

David Lerner
New York, NY

Time to wipe the plenum off our faces. — HB

Adams' Apple

"From the Ground Up" by Douglas Adams (May '90, page 148) was absolutely on the mark in showing how human

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LETTERS

your magazine is, just like the Mac. I love Adams' books, and it's my dearest hope that he continues writing on *any* Macintosh. Incidentally, the number *42* is approximately 10.5 million years old.

Mark J. Sieler
Java, SD

Windows Watchers

"Windows Won't Kill the Mac" (May '90, page 315) by Thom Hogan was interesting. I agree with the premise of the article, but with all its faults, Word for Windows is a real help to me. I have *some* Macintosh functionality on that otherwise-useless mass of silicon and metal on my desk at work. I am looking forward to getting the capabilities of Word for Windows on my Mac at home, where those abilities will be faster, more stable, and easier to use.

Unfortunately, Word for Windows does possibly the worst thing it could do for the Mac. It makes IBM users *think* they can do everything they can do on a Mac on a PC. That makes it even harder to convince someone to switch to the Macintosh. I'll take a Mac Plus over the highest-end PC any day.

Tim Cimbura
Columbia Heights, MN

Mac users are thoroughly spoiled, so perhaps it isn't surprising that Thom Hogan's anti-PC bias showed in "Windows Won't Kill the Mac." He could have at least *seemed* more objective and at the same time have had the comparison come out even more in favor of the Mac implementation of Word.

I too use Mac Word and Word for Windows. Unlike Thom, I find WinWord slower in all regards on my 12-megahertz 286 than Mac Word on the Macintosh II at the office. Some of the dialog boxes seem to take an eternity to act and clear, and often the pointer icon is there for seconds before the hourglass appears, letting me know that I am supposed to sit and fidget. I've read comments on bulletin-board services that suggest that my experience is the norm, even with souped-up 386s.

Unless Microsoft does the impossible with Windows 3.0, PC devotees will *think* they have caught up with those lucky guys who could afford Macs but Mac users will know better and the Mac advantage will be secure for a few more years.

Me? I'll stick to my clone at home until something brings Apple pricing to where it ought to be.

Colin Taylor
Mansfield, TX

Bigger Isn't Better

Robert Wiggins put an insulting twist on an excellent piece of advice ("Creative Cost Cutting," April '90, page 27). His suggestion to shop by mail order is right on target. However, his recommendation of "the majors, the ones with the multipage ads" while relegating "the smaller outfits" to use by only "the brave" is both ill-conceived and a slap in the face to your small-space advertisers.

MacStore has been in the pages of *MacUser* since the birth of your magazine. Over the years, we have watched so-called multiple-page majors come and go. Even today, with the burgeoning catalog clones, few match our continuity or attempt to duplicate our services.

Quality in a business is instilled by its people, not by the gloss of its advertising. Big does not mean better.

Jim Tucker, Manager of Marketing
MacStore
New Braunfels, TX

Haranguing on the Telephone

This is a warning to readers who may have succumbed to Apple's Christmas advertising of rebates and extended credit. Apple Credit has apparently sold its account list to a bunch of telemarketers. At least, I got a call from an outfit selling "auto advantage" (a discount auto-service plan) that claimed to be calling because of my account with Apple Credit.

I expected to get onto some more mailing lists when I bought a Mac but not onto a phone list. I object strenuously to telemarketers. I have a phone for my convenience, not theirs.

I would like to ask any readers of *MacUser* who have been getting such calls to protest to both Apple and Apple Credit. Maybe if we get together, we can put a stop to this invasion of privacy.

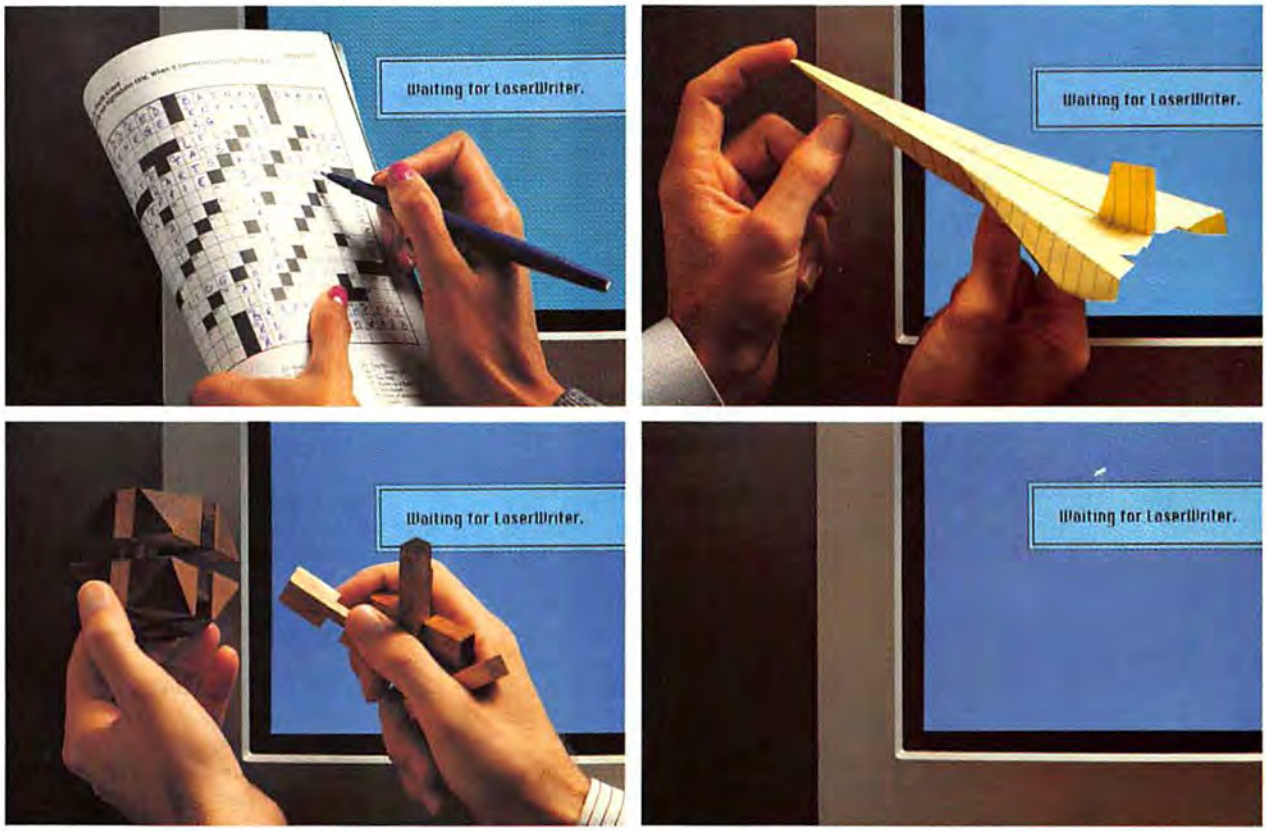
David Doan
San Diego, CA

CD-ROM Ratings

We are responding to the CD-ROM article in the March '90 *MacUser* ("Most Valuable Players," page 150). Here at EDUCORP, a pioneer in the CD-ROM industry, we use the Apple, Denon, and Toshiba CD-ROM drives.

A two-and-a-half-mouse rating for the

Idle Macs Are The Devil's Playground.

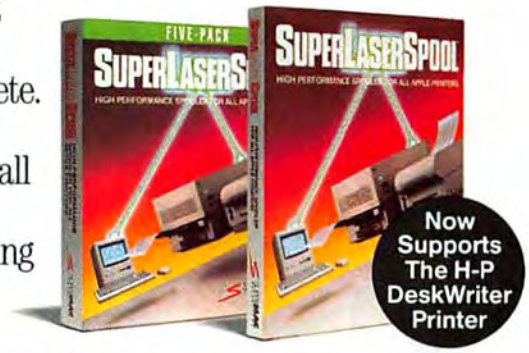


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LETTERS

Denon DRD-253 CD-ROM drive is a great injustice. The Denon's access time is about the same as that of the Apple drive. Another SCSI port can be installed for about the same price as a terminator, although most users find internal termination to be more convenient.

The size of the Denon drive allows you to put your Mac or your Mac II monitor on top of the drive so you can free up desk space. Denon also has a sleep mode that shuts the laser down when the drive is not being used. This feature helps protect the drive from wear and tear.

The power button on the Denon is located conveniently on the front of the drive, so users do not have to reach around to the back to turn the power off. Finally, Denon offers a toll-free technical-support line.

Suzi Nawabi, Manager
EDUCORP
Solana Beach, CA

Sampling Advice

"Sound Advice" (May '90, page 284) stated that "*down-sampling* is when you take a sample recorded at one frequency and use SoundEdit's Mixer option to convert it to a lower frequency." This is true, but you didn't mention that the same effect can be accomplished with copying and pasting, a much faster and more natural method.

You also left out that you can "up-sample" by using either method, although in normal circumstances you wouldn't want to. An up-sampled sound requires more disk space, without a corresponding increase in sound quality. Nevertheless, in some cases it might be useful. For instance, if you wanted to use a sound sampled at 11K in Crystal Quest, you would have to up-sample it to 22K to make it play at the right pitch.

Jason Townsend
San Antonio, TX

Abstract Addition

Thank you for publishing the short review of MacInfo in Bobker's Dozen (June '90, page 44). We would like to make one important correction: MacInfo *does* include a short abstract for every article it indexes. In fact, the current version of MacInfo has 4,460 abstracts from *MacUser*, *MacWeek*, and other Mac publications.

Emanuel Rosen
Niles and Associates, Inc.
Berkeley, CA

Running Boards

Who needs accelerator boards? Mac Plus owners, that's who. Please run some of the boards through your MacUser Labs.

Ricardo González
Mayagüez, Puerto Rico

We're ahead of you on this one. Check out "Chasing the IIfx: Accelerators" this month to find out whether the accelerator option can compete with Apple's current upgrade programs. — JB

Secret Keys

Almost every month, an article or a letter discusses "keyboard secrets" — obscure but helpful Finder commands, most of which are nowhere to be found in the instructions that come with a Mac. Although I appreciate the hints, it angers me that it's necessary to learn them in this way.

Why must Apple keep such things secret? Doesn't the purchaser of the product have the right to this information in the manuals? Is there anywhere users can get all this information in one place, preferably without having to pay (again) for it?

Gordon Paine
Fullerton, CA

The Grass Is Bluer . . .

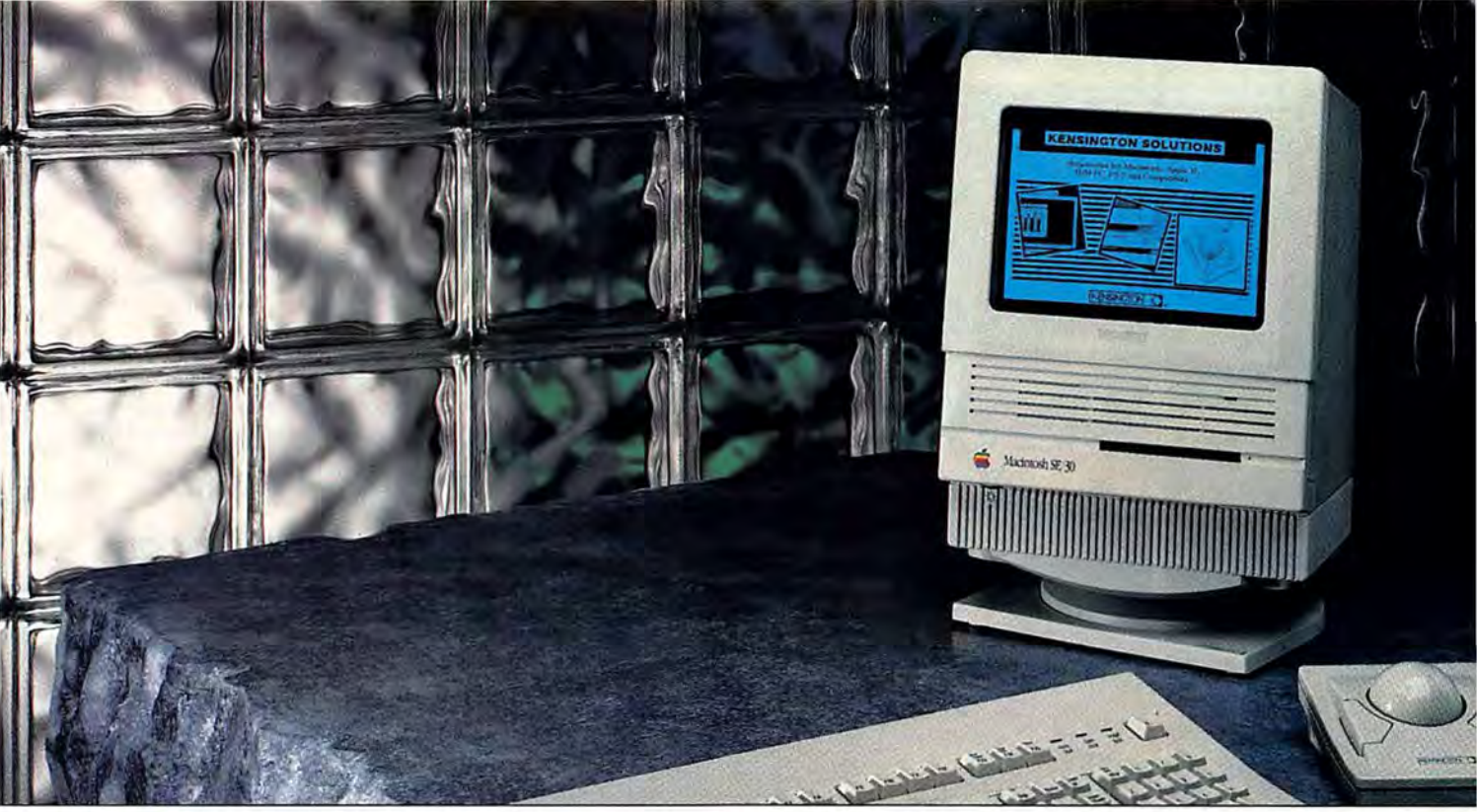
Although I'm a dyed-blue-in-the-wool IBM microcomputer user, I am also fortunate enough to have access to Macs and *MacUser* magazine. Allow me to cheer the Mac. I like it. However, Mac fanatics are nuts for putting up with the extortionist prices charged by Mac suppliers. Prices for 20-megabyte hard-disk drives were quoted as ranging from a "low" of $399 to a high of $899!

Even under the assumption that I would tolerate a minuscule, creeping, 20-megabyte hard-disk drive, I would not expect to pay more than $250 for the same capacity and performance in the IBM marketplace. Sincerely, and hurting for you . . .

Mark Wheeler
New York, NY

. . . on the Other Side

I'm a PC hacker who's been stuck with a Mac at work. Actually, I don't mind too much. If Mac folk weren't so haughty (bordering on arrogant), it would be quite a pleasant platform to work on! (Actually, I like the long filenames better than the bit-mapped interface or anything else!) Naturally, I'm turning to *MacUser* for



EYESORE VS. EYE PROTECTION

As today's monitors get bigger and brighter, anti-glare filters become less of an option and more of a necessity.

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LETTERS

info — I *love* the C programming column. It's reminiscent of my huge collection of *PC Magazines*.

Only one question: Does Paul Somerson remember his *PC* roots at all? He seems to embody a sort of aggressive elitism reminiscent of badly recycled Ayn Rand!

John Faughnan (72300,3466)
Via Zmac

When asked to reply, Paul shrugged. — JZ

Au Current

Being a Swedish reader of *MacUser*, I have so far missed an important detail every time I read a review about some types of hardware: Does it work with our European electricity — 220 volts/50 hertz? But now it is here! In the March issue, you have added this vital info to your test of CD-ROM drives ("Most Valuable Players," page 172). I am sure all your non-American readers appreciate this.

Kjell Olsson
Hoting, Sweden

The Drivel Made Me Do It

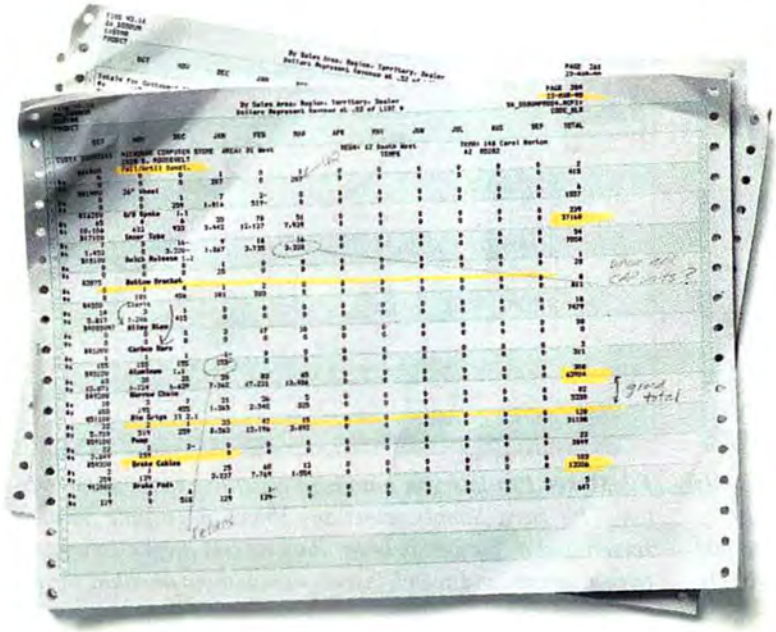
John C. Dvorak has done it again: put his big fat foot in his big fat mouth. His innovation analysis of Apple Computer ("Linear Thinking," June '90, page 350) is nothing more than his usual drivel. Talk about no innovation at Apple — he should analyze himself. And as far as the Apple IIGS' being a "yawner if there ever was one," that's ridiculous when you consider the video-overlay capability developed for it, among other enhancements.

Dave Shively
Sunnyvale, CA

CLARIFICATIONS

Since our review of TypeStyler appeared (May '90, page 110), Broderbund has released a version (1.01) that does convert most Adobe Type 1 fonts. Some exceptions remain, however. Certain typefaces in the Adobe Originals collections (Lithos and Juniper, for example) cause the program to freeze. The program encounters similar difficulties when dealing with the Adobe Symbol font. Complex Type 3 fonts with gradient fills (ImageClub's Chrome font, for example) can also crash the program or cause the screen to freeze. A Broderbund representative said the company is investigating this problem.

You can't always choose the data you have to manage.



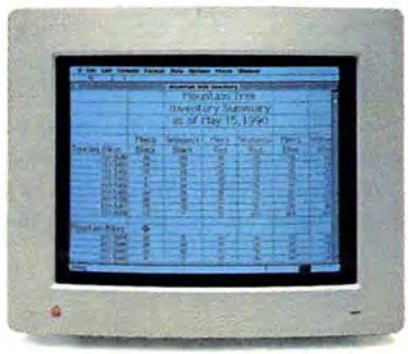




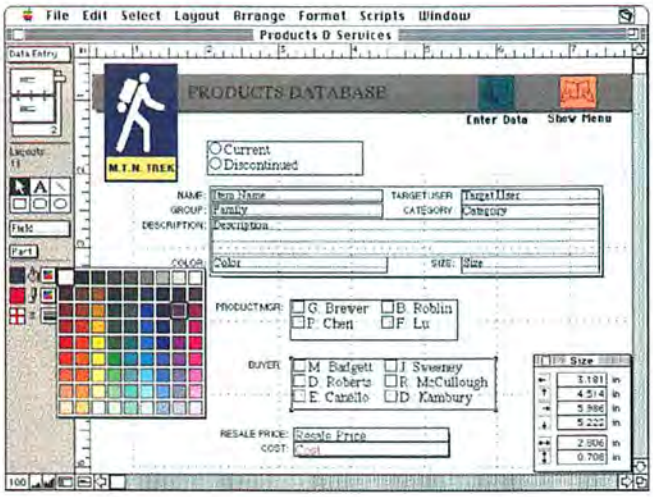








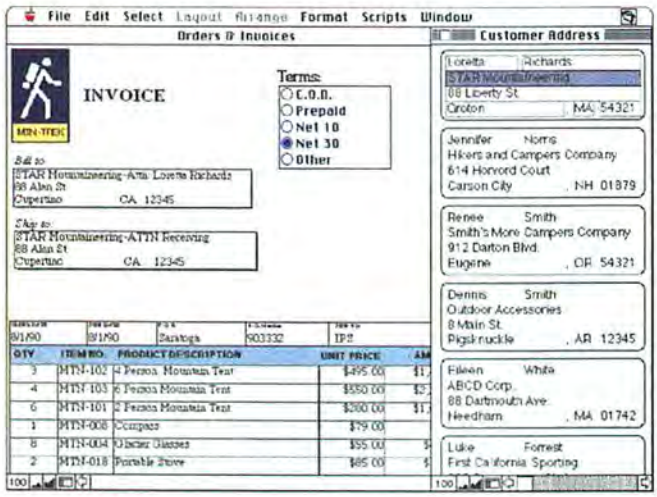
But you can choose how to manage it.



FileMaker® Pro software includes sophisticated drawing tools so you can create layouts in any form you choose. Pop-up menus, radio buttons and checkboxes make entering data fast and accurate. And a full palette of colors helps people vividly see your thoughts.



FileMaker Pro lets you automate repetitive tasks with "buttons." It's easy. Simply select any object or graphic on the screen and a "button" is born. Buttons can invoke commands, trigger scripts, and switch layouts—all without plodding through a programming language.

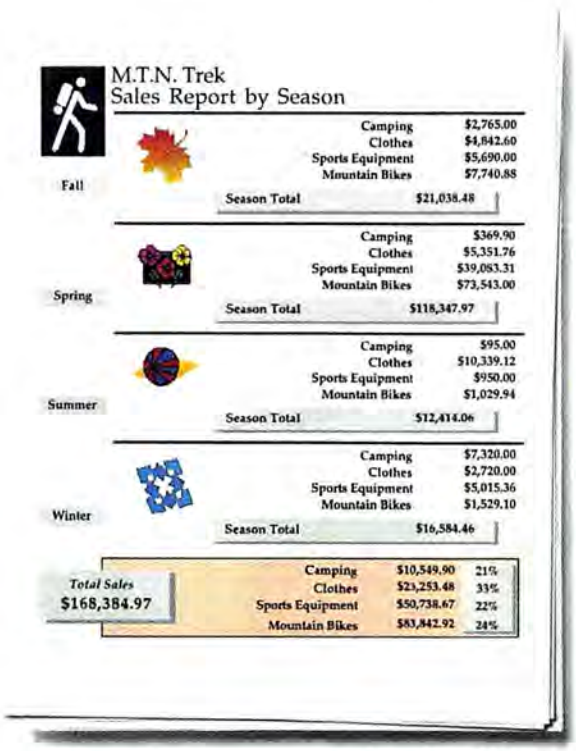


Multiple-file lookups let you relate data. For example, when you want your monthly invoices to each show customer address, FileMaker Pro looks at the customer name, searches the customer address file and fills in each address for you—all automatically.

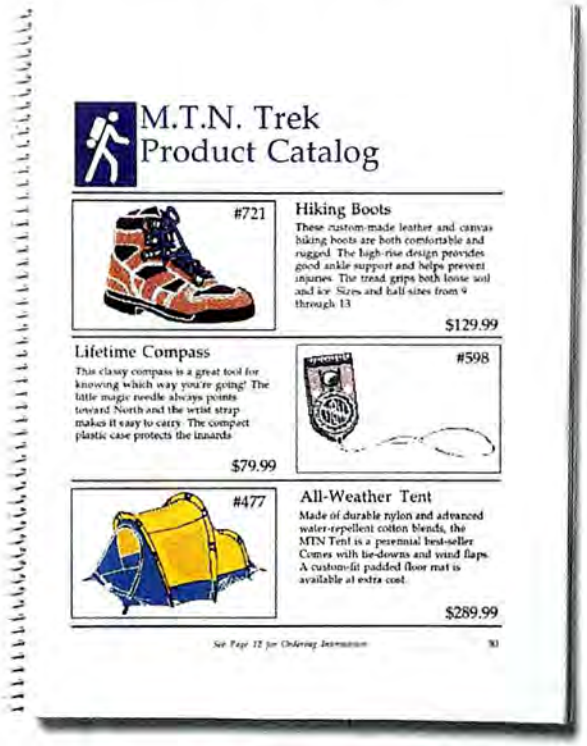


You can share files on a network and control exactly who sees what on their screen. For example, if you want to share the hire date of an employee, but not his salary, simply check the appropriate boxes in the access dialog box. The hire date field will be shown. The salary field will not. Security is this simple.

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PAUL
SOMERSON

Windows Watchers



By Paul Somerson

If someone ever decides to produce a Hollywood farce about the computer business, they won't even need to write a script. All they'll have to do is round up a few front pages from the industry newsweeklies and hire some actors to read them aloud.

Several months ago, Apple unveils its Macintosh IIfx, a 40-megahertz screamer so powerful that it eats dedicated graphics workstations for breakfast. Like all other Macs, it sports an attractive, truly intuitive interface and a high degree of smarts.

Like all other Macs, it can handle multitasking and memory-gluttonous software without a hitch, and it can run the nearly 5,000 applications that are on the market. Few journalists even lifted an eyebrow.

Then a week before Memorial Day, Microsoft trots out its amplified screeching hype machinery. Suddenly everyone forgets that this company was responsible for inflicting DOS as well as several utterly confusing memory-management schemes on 40 million beleaguered IBM users and that the two previous editions of its Windows software were about as popular as Jesse Helms at an art museum.

Chairman Bill Gates plunks down ten million bucks — one-hundredth of his bankroll — on a bicoastal potlatch designed to turn Windows 3.0 (or Win3) into a household word. And the media laps it up. You know those polls reporting that a fairly significant percentage of the American public can't even name the current U.S. president? Well, even those geeks have heard about Win3.

The response to this hoopla was certainly predictable. Headlines scream that Apple is dead meat. Breathless DOS wags actually liken it to the Second Coming. One benighted market analyst even announces that he's lowering his Apple stock recommendation.

So what does this epochal new Win3 offer? The ability to use more than 640K of memory. Proportionally spaced fonts. Icons and windows. Multitasking. Network support. Patterned on-screen backgrounds. A button-driven hypertext toolbox with its own scripting language. Hmm . . . . Hold on a second . . . . Haven't we seen all this somewhere before? Maybe on every recent Macintosh?

Never mind that Win3 can't really run very well on anything except pricey new '386 systems loaded with RAM and top-of-the-line monitors. Or that there aren't many applications yet available that actually take advantage of these new abilities. Or that it is really just one more thing slapped on top of DOS. Or that one reviewer lavished praise on it in the local Silicon Valley newspaper by gushing, "Windows no longer crashes as often . . . ."

A week after the media frenzy, exiled Apple exec Jean-Louis Gassée put it all in perspective. Speaking on-line, at the invitation of *MacUser* columnist Guy Kawasaki, Gassée used a car metaphor to compare Macs with DOS machines clanking along with Windows: "What is clear is that there isn't going to be a difference such as text screens vs. bit maps, menus, windows, mouse, anymore. Now that all cars have four wheels, the battle will be on quality and fits and finishes."

Exactly. Which is why Americans have shown that they prefer Hondas and BMWs over Detroit rattletraps. Macs are smooth and seamless; on even the best Win3 systems, the seams really show. Input and output are still vastly better with Macs — as are overall system functions and housekeeping chores. And built-in networking. And a huge inventory of time-tested applications that all operate with the same basic commands. And if the Cupertino skunkworks stays on track, the next two years of Mac advances should make Win3 look like one of those pathetic tin cars Russians wait years to buy.

We asked some of *MacUser*'s in-house industry watchers for their opinions on the recent events. Here's their lowdown:

Associate editor Russell Ito thinks that "Windows 3.0 ultimately may hurt IBM's sales even more than it hurts Apple's. Those who find Windows attractive may choose to go with the Mac simply on the basis of Apple's longer — and deeper — commitment to a graphical user interface." Similarly, technical editor John Rizzo concedes that "Win3 may be improved, but it's still only an application sitting on top of DOS, unlike the Mac's Finder, which is integrated with both the operating system *and* with applications."

Nancy Groth, *MacUser*'s managing editor, agrees but wonders whether Apple can get that message across to potential customers. "The benefits of the Mac — even with the enhancements coming under System 7 — are subtle. One of the Mac's strongest points — consistency across both time and applications — is not something users see in a five-minute demo. Win3, on the other hand, is clearly a more professional-looking product than Windows 2. Ultimately, though, Win3 will increase Apple's market share by further legitimizing graphical user interfaces."

Macintoshes are smooth and seamless; on even the best Win3 systems, the seams really show.

Associate editor Bruce Mewhinney points out some of the less cited advantages of the Mac, ones that are

unaffected by the release of Win3. "Even more important than the Mac's speed and consistency advantages is the ease with which the average user can install, reconfigure, and troubleshoot the computer's operating software, data, and application programs. Mac users can also enjoy a continuous software-upgrade path from the entry-level Mac Plus right up to the Mac IIfx."

Senior editor Lee Thé notes, however, that "Win3 doesn't have to be better than the Mac to succeed; it just has to work reliably and give PC users a marked improvement over plain-Jane DOS applications. And it looks as though Win3 does those things. So it behooves Apple and independent Mac product developers to get busy filling in the gaps."

Mewhinney replies that the Cupertino crowd is certainly keeping busy. "While IBM, Microsoft, and the clones are busy copying the Mac's windows and mice, Apple has been developing HyperCard, System 7, A/UX, Ethernet links, ISDN, desktop video, CD-ROM, and more."

We also posted the Win3 question on Zmac, our new on-line service. First, what do users like about Win3? Louise Kohl (70411,204) anted in with "It has a great solitaire game . . . ." David Smith (76424,3254) countered that "Windows 3.0 is important not because of what it *can* do but what the stuffed shirts and uninformed press *think* it will be able to do."

Meanwhile, Raymond E. Feist (76657,2776) says that peaceful coexistence, if not full-fledged détente, is possible. "Windows 3.0 is a nice addition to the MS-DOS world. It will make some MS-DOS users very happy. It won't take Mac buyers away from Apple, because no matter how much you squint your eyes to make it all soft, warm, and blurry, no matter how hard you wish, no matter how much you want it to be as good an interface as a Mac . . . it's just not."

Vernon Keenan (76535,1612) thinks the question is moot; he believes that "Most DOS users are quite happy with their character-based WordPerfect and Lotus 1-2-3" and won't get around to upgrading to Win3 for a while.

But not everybody believes Apple can survive the Win3 blitz. Al Vinci (76216,466) thinks this could be the last straw, citing various Apple problems besides the new competition from Win3 — everything from MultiFinder crashes to paying more than his PC colleagues pay for virtually identical peripherals — and thinks that "Windows 3.0's intro date of May 22, 1990, will go down in history as 'The Day The Mac Died.'"

What do you think? Drop me a note or log on to Zmac, and let me know if you think Win3 is the Windows of opportunity or the Windows of vulnerability.



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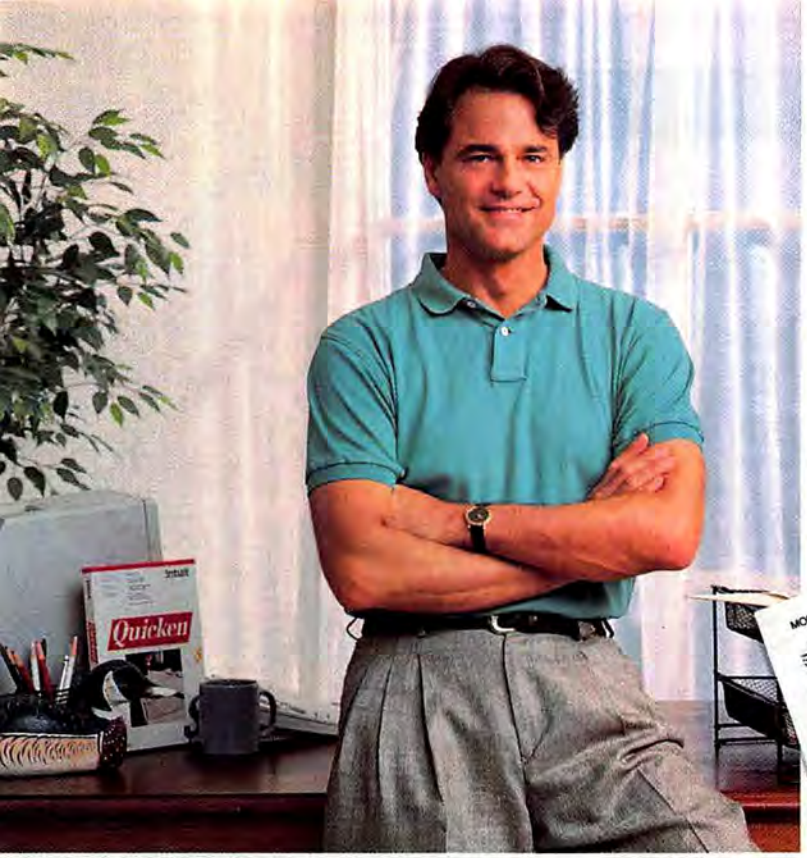
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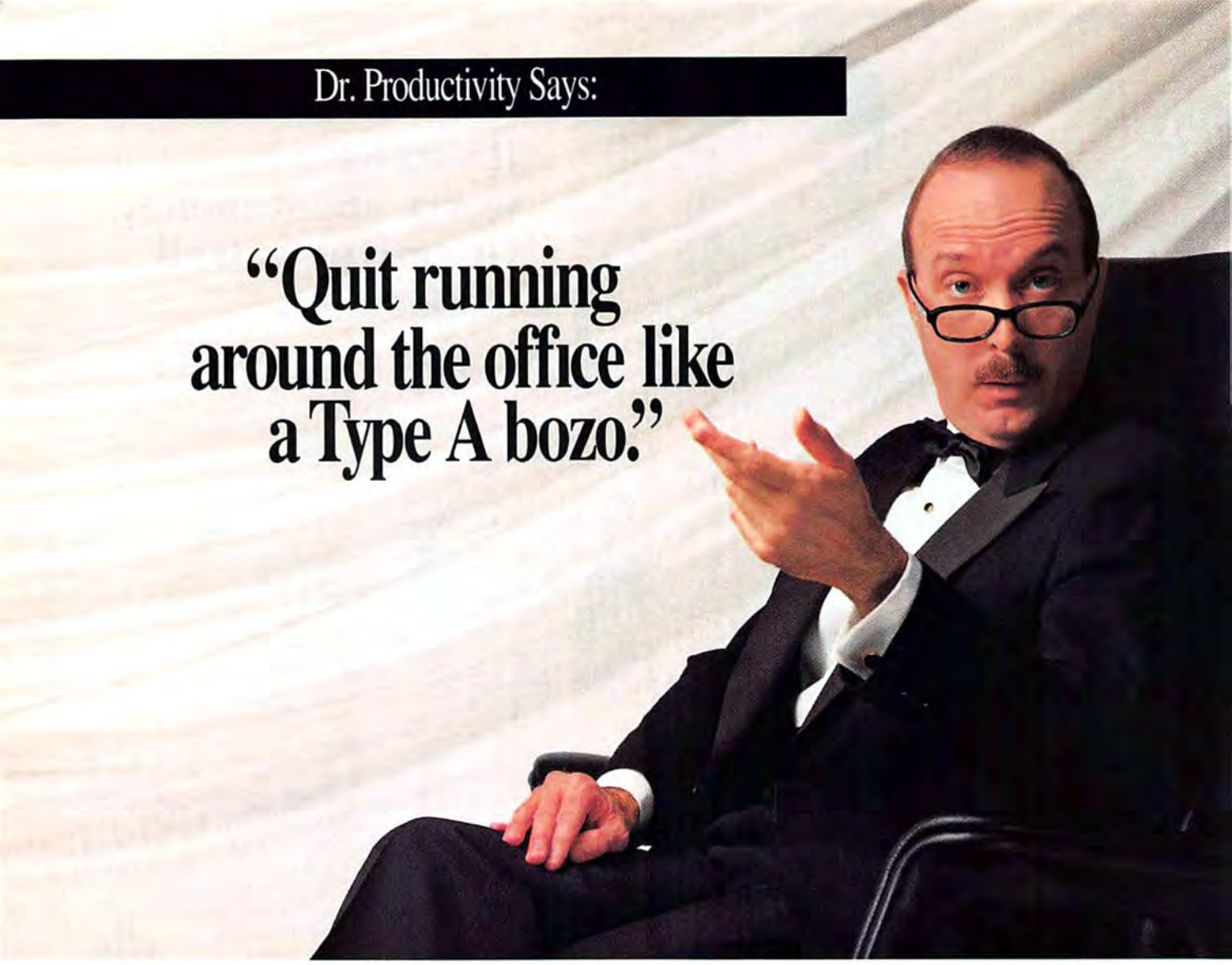
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Presentation Quality



Good presentations are a lot rarer than good presentation programs. MORE 3.0 and Persuasion 2.0 continue to push the envelope of presentation technology, while PowerPoint, Visual Business No. 5, and the rest of the pack offer plenty of alternatives. The Mac has always been a favorite machine for preparing presentations — even in the days of MacWrite and MacPaint — and these new presentation specialists make it even easier to produce beautiful results. The hardware has kept pace too, with several options for output, ranging from on-screen display to transparencies to slides (in full color or black-and-white). There's a hardware and software combination for almost every budget.

But no hardware or software can give you common sense and good taste. No matter what medium or program you use to create your presentation, *you* are ultimately responsible for the look and feel of the finished product. To help you in your quest for the perfect presentation, here are ten ROTs (rules of thumb) that apply to all types of presentations. Although these suggestions are based on practical experience, they aren't cast in stone. These guidelines are worth following unless you have a compelling reason not to or have given enough presentations that you're sure of what you're doing.

Keep It Simple

A common error many people just starting out in presentations make is trying to squeeze too much information onto a slide. Even those with experience sometimes get carried away and make a slide too information-dense. The first few ROTs should keep you safely out of this pitfall.

ROT #1: Write net. Use bullets and short phrases rather than sentences. Bullets are outline placeholders on which you build your presentation. Use no more than five bullets per slide and no more than five words per bullet (preferably short words). Remember, you can use notes to jog your memory.

ROT #2: Use graphics wisely. Graphs should be as simple as possible with no obfuscating text. There should be no more than two graphs per slide.

ROT #3: Simplicity is key. If you're working in color, use only a few coordinated colors. Whether you're using black-and-white or color, keep the number of fonts, styles, and sizes strictly limited. Three sizes of the same font and style are almost too many.

Present, Don't Read

Another mistake is to read the material either off the slides or from notes. There's nothing more boring — and more insulting to a viewer's intelligence — than enduring someone reading his slides. If all the presenter has to offer is a recitation, he didn't have much of a presentation to begin with. ROT #1 helps avoid having sentences on the slides, and the following rules should also help.

ROT #4: Know your material. Rehearse. Don't read the slides, and don't read from your notes. If you've learned the material and rehearsed it well, you can use the slides to jog your memory and appear to give a spontaneous presentation. Rehearsal is even more important if someone else (such as an assistant or the art department) designed the presentation for you.

ROT #5: Have backup material ready. If you get lost, flustered, or lose your train of thought, have notes to help you get back on track. Just remember ROT #4, and stop using your notes as soon as possible.

ROT #6: Keep it short. Five minutes per slide should be an absolute maximum, and two minutes is better. If you spend more than five minutes on a slide, you're going to lose your audience. If you have that much to say, you need another slide.

ROT #7: Maintain suspense. If you make handouts of your slides, don't pass them out until after the presentation. If the audience members have handouts during your presentation, they'll skip ahead and anticipate you instead of keeping pace with you. If you know the audience will need to take notes, distribute the handouts, but be aware that they'll read ahead, and plan your presentation accordingly.

No hardware or software can give you common sense and good taste. You are ultimately responsible for the look and feel of the finished product.

Effective Yet Honest

Every day in hundreds of businesses across the country, honest presenters lie to their bosses, employees, and customers. They don't mean to, but in an attempt to add some sizzle to their presentations, they make their charts and graphs misleading and even flat wrong — which is worse.

Here's a true story: A Texas oilman used a chart with drawings of two barrels of oil, one of which was supposed to be twice



By Robert R. Wiggins

ILLUSTRATION: NANCY TOBIN



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the size of the other. As is typical of charts such as this, the second barrel was drawn *twice* as tall as the first one, but it had the same proportions. This made the second barrel actually occupy *four* times the area on the chart. And if the drawing had been done with 3-D perspective, the second barrel would have had *eight* times the volume of the first barrel!

How can you avoid such unintended distortions? If you exercise a little care and follow two more ROTs, you can keep your graphs honest.

ROT #8: Keep it flat. Don't introduce an extra dimension unless it illustrates a point. There's currently a trend toward 3-D graphs that represent only two dimensions' worth of variables. A little shading or a drop shadow is one thing, but full 3-D should be used when you really have three variables.

ROT #9: Scale properly. When using pictographs (such as the oil barrels), use numbers or multiple items of the same size to make comparisons, rather than size alone. In our example, if the oilman's chart had shown two stacked barrels instead of a larger one, the concept of "twice as much" would have been clear — with no chance of misinterpretation.

There's a modern classic on this subject called *The Visual Display of Quantitative Information* by Edward R. Tufte ($36, available from Graphics Press, Box 430, Cheshire, CT 06410). If you plan to do a lot of presentations, you should get this book and study it. Tufte's long-awaited sequel, *Envisioning Information* ($48, also from Graphics Press), is hot off the presses and also contains a wealth of information. If you follow all Tufte's recommendations, you won't be guilty of distorting information in your charts and graphs.

There's one last ROT you need to remember when preparing presentations:

ROT #10: Don't hide behind your presentation. Don't let technology and/or art obscure your message. When you're using these state-of-the-art presentation programs, it's easy to be seduced by their nifty features. MORE's background gradients, Persuasion's graphic builds, and Visual Business' 3-D charting, for example, are all easy to overdo, and the result is a presentation in which style smothers substance.

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System Requirements. Macintosh with 1MB of RAM and hard disk, System 4.2 or higher. Compatible with Microsoft Word 3, 4; MacWrite; MacWrite II; WordPerfect; WriteNow 2.0; Microsoft Works; Microsoft Write; QuickLetter; Acta Advantage; and any text-only document.

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- Connect Business Info 1.5 ... 94.

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- Works 2.0b ..... 177.

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- EndNote 1.2.1 ..... 74.

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- Double Helix Multiuser ..... 315.
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- Bulk Mailer Plus ..... 178.

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- Exstatix 1.2 ..... 217.
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- Key Plan ..... 242.

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- Correct Grammar ..... 50.

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- Write ..... 82.

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- Nisus 2.02 ..... 240.

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- The Resume Kit ..... 35.

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- Clairvoyant ..... 50.

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Letraset
- ColorStudio ..... 1,578.
- DesignStudio ..... 598.
- FontStudio ..... 458.
- ImageStudio ..... 273.
- LetraStudio ..... 273.
- ReadySetGo! 4.5 ..... 273.

MacroMind
- MacroMind Accelerator ..... 124.
- MacroMind CD ROM ..... 142.
- MacroMind Director ..... 438.

MicroFrontier
- Enhance ..... 243.

Pantone
- Computer Color Book ..... 48.

Paracomp
- Milo ..... 155.
- ModelShop ..... 364.
- Swivel 3D 1.1 ..... 294.

Quark
- XPress 2.12 ..... 467.
- QuarkExtras ..... 53.
- QuarkStyle ..... 159.

Sabastian Software
- Image Grabber 2.0 ..... 31.

Silicon Beach Software
- Digital Darkroom 248
- Personal Press ..... 199.
- Super 3D 2.1 ..... 313.
- Super Card 1.5 ..... 188.
- SuperPaint 2.0 ..... 124.

Softstream
- Relational Objects ..... 154.

Solutions
- Curator ..... 70.
- SmartScrap & Clipper ..... 45.
- Super Glue II ..... 60.

SuperMac Software
- PixelPaint 2.0 ..... 224.
- PixelPaint Pro ..... 388.

Symmetry
- Picture Base 1.2 ..... 45.

Synergy Software
- KaleidaGraph 2.0 ..... 144.

T/Maker
- EPS Business ..... 82.
- Illustrations ..... 82.
- Animals & Nature ..... CALL
- ClickArt Business Cartoons ..31.
- Business ..... 31.
- Personal Graphics ..... 31.
- Publications ..... 31.
- Holidays ..... 31.
- Christian Images ..... 31.

Tactic Software
- ArtClip 1st Ed ..... 50.
- ArtClip 2nd Ed ..... 64.
- ArtFonts Pak ..... 129.
- FontShare ..... 148.
- Icon-It ..... 44.

Timeworks
- Publish It! ..... 224.
- Publish It! Easy ..... 111.

U.S. Micro Labs
- FontSizer II ..... 62.

Zedcor Inc
- DeskPaint/DeskDraw 3.0 ... 114.

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Established 1986

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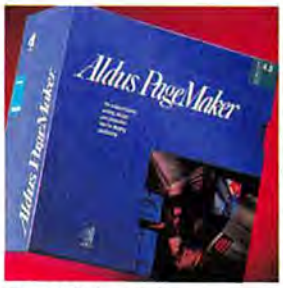
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Math Blaster - Mystery ..... 29.

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B3 020 & 030 w/HD ..... 34.
B4 Beyond the Basics ..... 36.
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P4 Advanced Features ..... 34.
P5 Pagemaker 4.0/ Part I ..... 34.
P6 Pagemaker 4.0/ Part II ..... 34.
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W2 Intermediate Level ..... 34.
W3 Advanced Level ..... 34.
W4 Additional Features ..... 34.
Learning Excel Training - Series
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XL2 Int. Spreadsheets ..... 34.
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XL7 Advanced Macros ..... 34.
XL8 Macros for Excel 2.2 ..... 34.
XL9 What's New for 2.2 ..... 34.

Simon & Schuster
Typing Tutor IV ..... 28.

Software Toolworks
M. Beacon Teaches Typing ..... 31.

Spinnaker
Typing Made Easy ..... 25.
S.A.T. Score Improvement ..... 56.

True BASIC, Inc.
Algebra ..... 37.
Arithmetic ..... 37.
Calculus ..... 37.
Discrete Mathematics ..... 37.
Pre-Calculus/Trig. ..... 37.
Probability Theory ..... 37.
TrueSTAT ..... 37.
Combo Packs w/Workbook
Algebra Combo Pack ..... 44.
Calculus Combo Pack ..... 44.
Pre-Calculus Combo Pack ..... 44.

MUSIC

Tactic Software
Sound Clips 1 & 2 ..... ea. 48.

Ars Nova
Practica Musica ..... 68.

Bogas Productions
Studio Session ..... 44.
Super Studio Session ..... 64.
String Quartet, Country, Heavy Metal, Sound Effects, Brass . 11.

Broderbund
Jam Session ..... 28.

Coda
Finale 2.0 ..... 558.
Mac Drums ..... 30.
MusicProse ..... 186.
Perceive ..... 49.

Electronic Arts
Dlx Music Const. Set ..... 83.
Deluxe Recorder ..... 98.

Farallon
MacRecorder 2.0 ..... 158.

Great Wave Software
Concertware + MIDI 5.0 ..... 97.

Mark of The Unicorn
Professional Composer ..... 394.
Professional Performer ..... 394.

Passport Designs
MasterTracks Jr. ..... 89.
MasterTracks Pro 4.0 ..... 355.
MIDI Interface ..... 75.
☛ MIDI Transport ..... 275.
Note Writer II ..... 320.

Primera Software
Different Drummer ..... 58.

Resonate
Listen 2.1 ..... 61.

PROGRAMMING

Borland International
Turbo Pascal 1.1 ..... 66.
Turbo Pascal Tutor 1.0 ..... 49.

Digitalk
SmallTalk/VMAC ..... 124.

High Performance Systems
STELLA For Business 2.1 ..... 394.
STELLA Stack1.0 ..... 258.

ICOM Simulations
HyperTMON ..... 57.
TMON 2.8.4 ..... 86.

Infosphere
Liaison ..... 174.

Mainstay
V.I.P. ..... 87.

Microsoft
Quick BASIC 1.0 ..... 65.

Serius
Developer ..... 339.
Programmer ..... 210.
Object & Power Objects . ea. 64.

SmethersBarnes
ProtoTyper 2.1 ..... 184.

Softstream
HyperHIT I ..... 126.
HyperHIT II Relational ..... 278.

Somak
Script Edit ..... 48.

Symantec
Just Enough Pascal ..... 51.
Think Pascal 3.0 ..... 165.
Think C 4.0 ..... 165.

TGS Systems
Prograph ..... 124.

True BASIC, Inc.
True BASIC Language 2.02 . 56.
True BASIC Toolkits
3-D Graphics ..... 39.
Business Graphics ..... 39.
Scientific Graphics ..... 39.

UTILITIES

1st Aid Software
Complete Undelete ..... 34.
Deluxe 1st Aid Kit ..... 114.
☛ Sector Collector ..... 32.

Abbott Systems
CanOpener 1.1 62

Affinity Microsystems
Tempo II ..... 98.

Aladdin Systems
☛ Shortcut ..... 39.
Stuffit Deluxe ..... CALL

ALSoft
DiskExpress II ..... 53.
Master Juggler ..... 63.
MultiDisk ..... 48.

ASD Software
Fileguard ..... 128.
Fileguard Office Pack 5 ..... 308.
Fileguard Office Pack 10 ..... 558.

Beagle Bros Inc.
FLASH ..... 119.

Berkeley System Design
After Dark ..... 22.
Stepping Out II 2.02 ..... 49.

Borland International
SideKick 2.0 ..... 67.

Casady & Greene
QuickDEX ..... 30.

CE Software
MockPackage Plus ..... 30.
QuicKeys 1.2 ..... 61.
DiskTop 4.0 w/GOfer ..... 62.
In/Out (1-5 User) ..... 127.
In/Out (1-10 User) ..... 187.

Central Point Software
Copy II Mac 7.2 ..... 22.
Mac Tools Deluxe ..... CALL
PC Tools Deluxe ..... 44.

Custom Applications Inc
Freedom of Press ..... 256.

Dantz Development
Retrospect ..... 148.

Dubl-Click Software
Calculator Const. Set ..... 44.

Electronic Arts
Disk Tools Plus ..... 30.

Fifth Generation
Disk Lock ..... 105.
Fast Back II ..... 105.
PowerStation 2.5 ..... 33.
Pyro! 4.0 ..... 22.
Suitcase II ..... 42.

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ICOM Simulations
On Cue 1.3 ..... 34.

Insight Development
MacPrint 1.2 ..... 94.

Kent Marsh
MacSafe II ..... 106.
Night Watch ..... 79.
QuickLock ..... 55.

Loop Software
Picture Book ..... 38.

Magna
Empower I ..... 129.
Empower II ..... 223.

Microlytics
GOfer 2.0 ..... 44.
WordFinder ..... 34.

Microseeds
Astrix 1.0 ..... 38.
INIT Picker 2.0 ..... 36.
Redux 1.62 ..... 49.
Screen Gems 1.0 ..... 38.
Rival 1.0 ..... 48.

Peter Norton
Norton Utilities 83

Olduvai Software
MultiClip 2.0 ..... 68.
Plus 1.1 ..... 114.

On Technology
On Location ..... 74.

Software Innovations
HandOff ..... 29.

SuperMac Software
Disk Fit 1.5 ..... 57.
Network Disk Fit ..... 224.
Sentinel 2.2 ..... 86.
SuperSpool 5.0 ..... 58.
SuperLaserSpool 2.02
Single User ..... 85.
Multi User (1 to 5) ..... 285.

Symantec
S.A.M. 2.0 ..... 67.
S.U.M. II ..... 98.

Symmetry
HyperDA 1.2 ..... 45.

Williams & Macias
DiskFinder ..... 24.
myDiskLabeler III ..... 48.
Sticky Business ..... 88.

MODEMS & FAX

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InterFax 12/48 ..... 264.
InterFax 24/96 ..... 418.

Apple
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CompuServe
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Navigator 3.0 ..... CALL

Dove
DoveFax 24/96 ..... 278.

Everex
EMAC MD2400 MNP 5 ..... 224.

FreeSoft
Second Sight ..... 99.
White Knight 11 ..... 84.

Hayes
Smartcom II 3.1 ..... 84.

MacTech - SmartLink Modem
2400m (MNP 5) ..... 245.
2400s w/ cable ..... 139.

Orchid Technology
Orchid Fax Modem ..... 446.

Prometheus
MacFax 24/96 ..... 295.
Macknowledge ..... 147.
ProModem 2400 Mini ..... 156.
ProModem 2400 SE Int. ..... 209.
ProModem 2400 II Int. ..... 259.
ProModem 9600 V.32 ..... 768.
Travel Modem ..... 204.

Shiva Corporation
NetModem V2400 ..... 434.
NetModem 9600V.32 ..... CALL

Software Ventures
Microphone II 3.0 ..... 215.

Solutions
BackFax ..... 139.

Supra Corp.
Supra 2400 ..... 128.
Supra 2400 MacPac ..... CALL

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Versa Term Pro 3.0 ..... 174.

U.S. Robotics
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Virtual - SE/30, IIx, IIcx ..... 114.

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Computer Eyes-B/W ..... 194.

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524s (524e w/SCSI) ..... 238.
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548s (548e w/SCSI) ..... 478.
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68030 SE - 25MHz ..... 1,285.
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NETWORKING AND CONNECTIVITY

CE Software
QuickMail 2.2 1-5 Users .. 218.
QuickMail 2.2 1-10 Users .. 315.
QuickMail 2.2 1-50 Users CALL

DataViz
MacLink Plus PC 4.0 ..... 118.
MacLink Translators ..... 98.

Dayna Communications
DaynaFile-Single Drive
360k 5.25in. ..... 497.
DaynaFile-Dual Drives:
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360k 5.25/1.44 3.5in. ..... 748.
DOS Mounter ..... 54.

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Star Controller EN ..... 1,599.
Star Connector (10 Pack) .. 137.
Traffic Watch ..... 124.
Repeater ..... 312.
PhoneNet Check Net ..... 63.
PhoneNet/AppleTalk Adapter . 8.
DB-9 ..... 31.
DIN-8 ..... 31.
DIN-8 (10 Pack) ..... 198.

Insignia Solutions
SoftPC ..... 244.
SoftPC Portable ..... 244.
SoftPC EGA/AT ..... 144.

Microcom Software
Carbon Copy Mac- ..... 118.
Carbon Copy Mac-TwinPak 179.

Microsoft
Microsoft Mail 2.0
Mail Server 2.0 ..... 248.
1 Workstation ..... 83.
20 Workstations ..... 968.

TOPS
TOPS DOS Ver. 2.1 ..... 117.
TOPS 3.0 Network Mac ..... 186.
TOPS 3.0 Network PC 3.5" 164.
TOPS 3.0 Network PC 5.25"164.
Flash Card (Dos) ..... 154.
TOPS FlashBox (Mac) ..... 118.
TOPS Repeater ..... 118.
TOPS Teleconnector ..... 23.
TOPS NetPrint 2.0 ..... 118.
InBox 3.0 DOS Admin. ..... 214.
InBox 3.0 Mac Admin. ..... 214.
InBox 3.0 Plus Mac ..... 638.

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Lap-Link Mac Release III
Connectivity Pack ..... 113.
Network Pack ..... CALL

Cayman Systems
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The Resume Kit ..... 35.

Strata
StrataVision 3D ..... 374.

Vertical Solutions
FastCat ..... CALL
FastEnvelope ..... 49.
FastLabel ..... 88.

Nuvotech
NuvoLink II ..... 271.
NuvoLink SC ..... 309.
Turbo Bridge ..... 318.
Turbo Net - DB-9 ..... 22.
Turbo Net - DIN-8 ..... 21.
Turbo Net ST - DB-9 ..... 30.
Turbo Net ST - DIN-8 ..... 30.

Shiva Corporation
EtherGate ..... 1,824.
NetBridge ..... 338.
NetSerial ..... 274.
TeleBridge ..... 338.

DISK DRIVES

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Fujitsu
800k Disk Drive (Plat.) ..... 139.

OnTrack Software
OnTrack ..... 28.

PLI (Peripheral Land, Inc.)

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TurboFloppy 1.4 ..... 358.
50mb turbo ..... 618.
250mb turbo ..... 1,948.
300mb turbo ..... 1,995.
600mb turbo ..... 2,995.

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40/40mb turbo ..... 1,936.
Optical ..... 3,995.

STORAGE MEDIA

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Sony Backup Tapes
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DS/DD 10 Pk. ..... 11.
High Density10pk ..... 20.
HD Rainbow 10pk ..... 21.

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Abaton
Pro Point ADB (SE & II) ..... 79.

Advanced Gravis
MouseStick ..... 64.
MouseStick (ADB) ..... 84.

Altra
Felix ..... 125.

Datadesk
Hyper Dialer ..... 29.
Mac 101 Keyboard ..... 129.
Switchboard ..... 175.

Kensington Microware
Turbo Mouse ..... 108.
Turbo Mouse ADB ..... 108.

Keytronics Keyboard
Mac Pro Kb-105 ADB ..... 125.

Kraft
QuickStick (512k & Plus) .... 39.
QuickStick ADB ..... 49.

Kurta - Is/ADB Tablets
Cordless 4 Button Cursor .... 64.
8.5" x 11" ..... 254.
12" x 12" ..... 384.
12" x 17" ..... 624.

Logitech
Scan Man 32 ..... 336.

Microtouch
UnMouse ..... 188.

Mobius
Fanny Mac ..... 55.

MSC Technologies
A+ Mouse (512k & Plus) ..... 58.
A+ Mouse ADB ..... 75.

NEC CD ROM Drive
Battery Pack ..... 68.
Intersect CDR-35 ..... 480.

Olduvai Software
Read-It! Personal 2.1 ..... 134.
Read-It! OCR 2.1 ..... 245.

Orange Micro
Grappler C/Mac/GS ..... 78.
Grappler LS ..... 68.
Grappler Mac LX ..... 128.
Grappler Spooler ..... 46.

Studiotronics, Inc.
Colorset 1.5 ..... 228.

Summagraphics Bit Pad Plus
12" x 12" Tablet - ADB ..... 315.

The Complete PC
Half Page Scanner/400 ..... 314.
Full Page Scanner ..... 758.

Thunderware
Lightning Scan ..... 368.
ThunderScan 5.0 ..... 184.

ACCESSORIES

American Power Conversion
UPS 110SE ..... 208.

Avery Labels
Diskette
Immagewriter 3 1/2" (250) 12.
Laser 3 1/2" (630) ..... 28.
Address
Clear 3 1/2"x15/16" (500) .. 11.
Transparencies
8 1/2"x11" (50) ..... 22.

Byte Brothers
Care-Free Security Kits-
for Mac 512K & Plus ..... 26.
for Mac SE, II & IIcx ..... 26.

Casio
Casio B.O.S.S. ..... 219.
CasioLink/Mac ..... 98.

CoStar
LabelWriter ..... 194.

Ergotron
MacTilt ..... 68.
Mouse Cleaner 360 ..... 9.

Golden Ribbons
Multi Colored ..... 7.
Black ..... 3.

Kalmar Designs
Teakwood Disk File Cabinet
45 Disks ..... 14.
90 Disks ..... 21.
135 Disks ..... 30.

Kensington Microware
Dust Cover SE ..... 8.
Dust Cover SE w/ Syst. Svr. .. 9.
ImageWriter Cover ..... 8.
Anti-Glare Filter ..... 31.
System Saver ..... 61.
System Saver SE ..... 51.
Universal Printer Stand ..... 14.
LaserWriter II Security Kit ... 31.
Mac II Stand w/o cable ..... 19.
Mac IIcx Monitor Stand ..... 53.
Mac II Monitor Stand ..... 63.
Mac II Mon. Cable Ext. Kit ... 31.
Masterpeice Mac II ..... 105.
Extended ADB Cable ..... 23.
Universal Copy Stand ..... 21.
Tilt Swivel ..... 21.
Printer Muffler 80 ..... 43.
Power Tree 10 ..... 18.
Power Tree 20 ..... 26.
Power Tree 50 ..... 53.
Apple Security Kit ..... 32.
A-B Box (DIN-8) ..... 62.
SE Rad./Anti-Glare Filter ..... 51.
Apple Color Monitor
Polorizing Filter ..... 62.
SuperBase ..... 29.
PowerBacker 360 ..... 267.
PowerBacker 450 ..... 337.
PowerBacker 520 ..... 397.
PowerBacker 800 ..... 746.
PowerBacker 1200 ..... 946.

Mac Packs - Linebacker
Navy, Wine or Gray
ImageWriter Bag ..... 45.
Mac Plus/SE Bag ..... 55.
Mac SE Bag Xt ..... 69.

MacZone
Leatherette DiskNotebook ... 12.
Mouse Pads- Red, Blue, Gray or Black ..... each 6.
SCSI Tester ..... 39.
Mac Tool Kit w/Ground Strap 8.

Targus Bags
Black or Blue
Plus/SE Bag ..... 54.
ImageWriter ..... 45.
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Deluxe Plus/SE XKB ..... 68.

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Praise the Macintosh

Back when I worked for Apple, my job title was software evangelist. Full of fervor and zeal, I would meet with developers, show them a Macintosh prototype, and convince them to develop Macintosh software. Based on this experience, I thought I knew a lot about evangelism.

I learned something recently: There are a lot of people who know a lot more about evangelism than I do. This revelation occurred when I attended the Billy Graham School of Evangelism in Albany, New York, last April. This was a four-day course in evangelism for pastors and ministers. (If you're wondering why I went, it's because I'm writing a book about evangelism.) Let me share this experience with you.

Not the Center of the Universe

I arrived in Albany after attending the 1990 National Apple User Group Conference. It was quite a transition to go from a conference where people talked only about Macintosh to a conference where people had barely heard of it. For a while, I was in a state of shock. My wife attributes this to the extensive ego damage that occurred because no one at the conference knew who I was.

One thing I could immediately relate to was the quantity of books for sale near the registration desk. Arthur Naiman of *Macintosh Bible* fame would die and go to heaven if he knew how many books were sold over the course of four days. I know I did.

Fish Out of Water

I was clearly a fish out of water at the conference. Attending was not the equivalent of a Macintosh owner going to Macworld Expo. It was the equivalent of a humble Macintosh owner going to a hackers-only event, such as the Apple Developer's Conference. Ministers and pastors are different from you and me. For example, when we sang hymns, everyone knew them by heart. Except me. I just hummed softly a lot.

For example, when the instructor said, "Let's read X passage together," everyone opened their Bibles directly to the passage. It's called DBA (Direct Bible Access). I had to develop another technique: "Hmm, he's about two-thirds of the way into his Bible. I'll start looking from about two-thirds through mine." After a while, I just pretended to be taking copious notes.

For example, I learned that it's perfectly OK to shout out "Praise the Lord" or "Amen" in the middle of a presentation. One woman shouted "Praise the Lord" every two minutes. I thought she was rude, but I guess I was wrong, because she was publicly introduced on the last day. If she were a member of BMUG, she would be the one at the meetings shouting "Praise the Macintosh."

Conference Camaraderie

The attendees showed an incredible level of camaraderie and friendliness — much more than those at Macworld Expo or Apple Developer's Conference attendees. I made two buddies on the first day — two guys from New Hampshire called Hank and Dick. Hank was a retiree who wanted to join a pastoral staff. Dick refurbished submarines during the week and was a pastor on weekends.

After we got into his 1970 Cadillac, Dick said, "Don't let the car fool you; we're as poor as Job." As we were driving around looking for the conference hotel, Dick said to Hank and me, "I'll drive, you navigate, and this guy will pray." We *did* find the place in a very short time.

Ministers and pastors *believe* — they don't complain about when the second coming will ship.

On Believing

If you think that Macintosh owners believe, ministers and pastors *believe*. And they don't complain — about bugs in the world or about when the second coming will ship. They also *believe* in prayer. If they prayed just once for System 7, it would ship, bug-free, before the Boston Macworld Expo (the August 1990 one, that is).

Our industry could learn a lot by going to a conference such as this. Admittedly, you have to get past the singing, the praying, the holding hands, and the arm waving and approach it with an open mind. Once you do, however,



By Guy Kawasaki

ILLUSTRATION NANCY TOBIN

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there is more solid marketing information than at the conferences I usually attend. For example, one session explained how to make good speeches. It covered background preparation, the qualities of an effective message, delivery of the message, and how to invite response.

We could also learn a lot about how to put on a conference. Every session started and ended on time. Each attendee was given a syllabus that contained the outlines of every presentation. (Have you ever gotten a syllabus for a Macworld Expo or an Apple Developer's Conference presentation?) And to top it all off, the four-day conference cost $25 and you could get a scholarship if you couldn't afford it. Twenty-five bucks barely gets you a hot dog and a Coke at Macworld Expo.

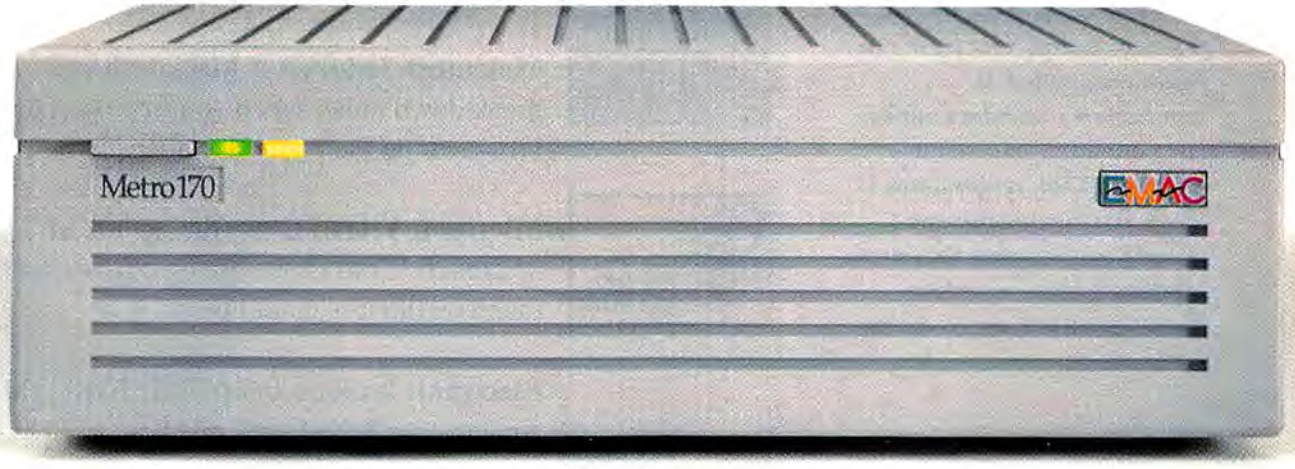
Outstanding Speakers

The speakers at the conference were outstanding. Apple should hire them to introduce its new computers. Every opening joke worked. Every speech was peppered with great stories, analogies, and metaphors. The speakers "built" the presentations: "There are four key points to discipling. Point 1 is . . . . Point 2 is . . . . Point 3 is . . . . Point 4 is . . . . " Frankly, the worst speaker at the conference (and I would be hard-pressed to pick a bad speaker) was about three times better than the best speaker in the computer business.

I tried to illustrate this to Dick one night during dinner at Denny's: "The plenary-session speaker was a much better speaker than John Sculley." His response was, "Who's John Sculley?" I didn't bother comparing the speaker to Jean-Louis: "Well, you see, there was this French guy with a diamond earring who was president of one-fourth of Apple until he told *The Wall Street Journal* that he was going to resign because Apple had brought in this German guy who also used to be in charge of one-fourth of Apple . . . . "

All in all, I'm glad I went. I learned a lot about evangelism. I learned a lot about Christianity. And I met some very nice people. I'm going to see them again when I'm in Boston for Macworld Expo. Maybe, I'll bring them to the Expo and show them the Macintosh way. A good evangelist never rests.

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Macintosh Rules of Thumb

Anthropologists tell us that it was the opposable thumb that gave mankind the power to be its best. So this month Guy Kawasaki is all thumbs — rules of thumb, that is. If you want megabytes of benchmarks and data specs, skip ahead to this month's MacUser Labs reports. But in case you just want some simple and unopposable rules of thumb, here are a few time-tested axioms to live by.

By Guy Kawasaki



Innovation: The level of innovation of a company's products is inversely related to the number of people the company brings to Macworld Expo.

Macintosh failures: A Macintosh will break down either when you first open the box — or on the 366th day after.



Microsoft Word: Every dialog box in Microsoft Word is one dialog box further than you think it should be.

Electronic bulletin boards #1: Each year a person is married adds one hour of connect time per month.



Electronic bulletin boards #2: Each bulletin-board service that a married person belongs to adds 5 percent to their probability of divorce.

Optimal amount of RAM: The optimal amount of RAM you need, in megabytes, is equal to the number of times you go to the bathroom during the day.



Optimal size of hard disk: The optimal size of a hard disk, in megabytes, is equal to twice a person's annual salary, in dollars. (Subtract 1,000,000 for Apple executives.)

ILLUSTRATION: NANCY TOBIN



Software for a new computer #1: It takes three years for a new computer to get a great collection of software.

Software for a new computer #2: It takes the market another year to realize it.

Software for a new computer #3: By the time the market realizes it, another computer is introduced.



The Macintosh love affair #1: During the first year, you love your Macintosh.

The Macintosh love affair #2: During the second year, you hate it.



The Macintosh love affair #3: During the third year, you understand it.

Vaporware: The length of time a product is vaporware varies inversely to the amount of Jolt that the programmers drink.

Bugs: The number of bugs in a product varies directly with the amount of Jolt the programmers drink.



Magazine columnists: A great magazine columnist can write three great columns a year. A lousy magazine columnist can write three great columns a year.

NewsLine

Reports and Analysis

LOTUS AND NOVELL PART

CAMBRIDGE, MA — Less than two months after the announcement of a merger that would have created the largest software company in the world, Lotus Development and Novell have canceled their $1.5 billion merger. The deal killer reportedly was the companies' inability to agree on the composition of the board of directors for the new venture.

APPLE ANSWERS ACADEMIA

CUPERTINO, CA — Responding to a direct challenge from IBM in the one field Apple Computer dominates — education — Apple has announced that it's slashing prices of Mac Pluses, SEs, and SE/30s it sells to educational institutions by as much as 66 percent. Only a week before Apple's announcement, IBM introduced a pair of personal computers aimed directly at the educational market and a card that lets the IBM units run Apple II software. As an additional measure to bolster its flagging educational sales, Apple also announced its plans for the first low-end color Mac. The unit is expected to feature a built-in color monitor and to have a list price of approximately $1,500, which would mean schools could purchase it for around $500. The new Mac, which will also be able to run Apple IIGS software, will reportedly ship by the end of the year and possibly as early as October.

SYMANTEC SWALLOWS NORTON

CUPERTINO, CA — The utilities war that many observers and users expected between Symantec and Peter Norton Computing has been averted with the signing of an agreement that will merge Norton into Symantec. The stock swap valued at approximately $70 million is expected to be completed in August. As with Symantec's other divisions, Peter Norton Computing will remain responsible for the development and technical support of its own line of products, including Norton Utilities for the Macintosh. The merger leaves the future of SUM II, Symantec's file-recovery utility, in doubt, but for the moment, Symantec has announced that it will sell and support both SUM II and Norton Utilities. No cross-purchase plan for current SUM II owners has been announced.

Bobker's Dozen

By Steven Bobker
Bobker's Dozen, c/o *MacUser*
950 Tower Lane, 18th Floor
Foster City, CA 94404
Your suggestions, comments, and products for consideration are welcome.

1 SAM (Symantec AntiVirus for Macintosh)

★★★★★



Good software improves with age, and the newest version of SAM, version 2.0, is a good example. Its most significant new feature is an upgrade procedure that lets users easily upgrade SAM to fight new viruses as they develop. As the updates come out, bulletin boards will post the necessary text strings, and you can obtain them by calling Symantec's 24-hour Virus Newsline (which should be, but isn't, a free call). This way, you won't have to wait for updates to be mailed or even have to pay for them.

The INIT portion, SAM Intercept, has been improved slightly, although its interface suffered a bit in the process. Virus Clinic (the batch-checking application that's included with SAM) now sports a better interface and some new power. I use SAM 2.0 as my own virus preventer/checker.

Symantec, 10201 Torre Road, Cupertino, CA 95014; (408) 253-9600. Virus Newsline (408) 255-8744. Version 2.0. $99.95.

2 Remote/WakeUp

★★★★½



One of the drawbacks of communicating with your Mac while you were away used to be the need to leave your Mac on. Remote/WakeUp is a slick hardware/software solution that lets you turn on an ADB-capable Mac from any modem and that also shuts the Mac down after a user-specified period of inactivity.

Remote/WakeUp starts up your Mac via a special modem cable that plugs into both the modem serial port and an ADB port. Any incoming modem activity can then generate the ADB startup signal. You have to wait for the Mac to boot before you can do anything else — other than this inconvenience, the cable is flawless.

Auto ShutDown is an INIT that turns the Mac off. It also works flawlessly, except that version 1.0 doesn't work if Suitcase II 1.2.6 is installed. It works fine with all other versions of Suitcase.

Remote/WakeUp was designed for use with Timbuktu and Timbuktu/Remote, but it also works with any communications software that automatically receives binary files (such as MicroPhone).

Farallon Computing, 2000 Powell St., Suite 600, Emeryville, CA 94608-9905; (415) 591-9100. Software version 1.0. $49.95.

3 Page Designs Quick! (PDQ!)

★★★★½

Most commercially available template programs lean toward the fancy and elegant side. Page Designs Quick! and Page Designs Quick! 5 take a quicker-and-dirtier route, which is often the best and most practical path to your solution. PDQ! is designed for newspaper publishing exclusively; you can use the templates for other projects, but there's no mistaking that these are newspaper layouts.



The two sets contain a lot of templates: 60 three-column, 60 four-column, and 225 tabloid-sized five-column layouts. Although the quality of the templates is excellent, they are bare bones, with no art at all. Thus, they require a bit of design expertise to use. You can modify all layouts from within PageMaker. The selection of templates is useful, and the manuals are very good.

PAR Publishing, 6355 Topanga Canyon Blvd., Suite 307, Woodland Hills, CA 91367; (818) 340-8165. PDQ!, $89.95; PDQ! 5, $159.95.

4 Comic People, Volume 2: Kids Stuff

★★★★

On the surface, a collection of characters and backgrounds for making comics about kids seems, well, questionable. Why is it here? Because Comic Strip Factory has more uses than just making funnies — for example, you can use it for training and editorial purposes.



This set of Comic Strip Factory add-ons, drawn by Trici Venola and Kurt Wahlner, is of extraordinary quality and range. Kids Stuff presents five children and two grown-ups of both sexes and various ethnic backgrounds. It also includes backgrounds, sound effects, a very spry cat, and some Little Extras.

One warning: This isn't clip art — it's best used from within Comic Strip Factory.

Foundation Publishing, 5100 Eden Ave., Edina, MN 55436; (612) 925-6027. $39.95.

5 Electric Dvorak

★★★★★



No, the Dvorak keyboard was not invented by John C. Dvorak. It's actually a remapping of the common QWERTY keyboard layout that was designed to facilitate faster typing. Electric Dvorak is the best Dvorak implementation for the Mac. The basic program is an installer that puts the small (about 3K) resources in your System file. Once that's done (and it takes only seconds), you can toggle between the standard key mapping and the Dvorak arrangement by using a keyboard command equivalent.

The INITs provided set either keyboard arrangement as the startup default. The documentation, which is all electronic, is brief but excellent. A small chart of the key-caps layout is provided as well.

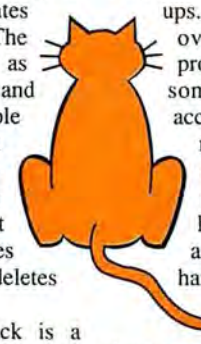
If you're already a Dvorak fan or are just learning touch-typing, Electric Dvorak is the best tool of its kind.

Tom Phoenix, Box 265-ed, Portland, OR 97207-0265. Version 1.0. $5 (or free if you include a self-addressed, stamped envelope and a blank formatted disk).

6 Cat•Back

★★★½

Disk cataloging and backing up are closely related: After all, backups require catalogs. Cat•Back is the first program I've seen that integrates the two functions. The cataloger is as good as they come: powerful and quick, with multiple levels of sorting. It finds and marks duplicate files — either all copies or the latest version. It selects files and, if you want, deletes them.



Although Cat•Back is a five-mouse cataloger, its backup portion needs some improvement. When I backed up from one partition to another on the same drive, the program crashed. Other backup performance was OK. You can make incremental (Cat•Back calls them archival) and mirror-image backups. The interface and overall operational procedure does need some polishing. An accessory Startup document called CatInit automatically keeps a list of the files that have been added to and deleted from your hard-disk drive.

Cat•Back isn't quite ready for top honors, but it certainly shows best-in-category potential.

Master Manufacturing, 118 N. Cypress St., La Habra, CA 90631; (213) 694-6861. Version 1.1. $39.95.

7 AutoBack

★★★★

AutoBack automatically creates copies of non-backed-up data files on another hard disk (or on a selected tape drive) whenever you save or activate a file. It doesn't back up applications and System files. You can also set AutoBack to back up only selected files. Unfortunately, your options regarding what to back up and what not to are a bit limited. Also, large files take a noticeably long time to save.

Performance is very good. AutoBack does its job quickly and unobtrusively in most cases. The few glitches I encountered mostly involved the setup and startup procedures and never caused any data loss. If you must have up-to-the-minute backup and have lots of hard-disk space available, AutoBack is the way to go.

Soft Trends, 2243 Pacific Ave., Suite B101, Costa Mesa, CA 92627; (714) 650-2158. Version 1.31. $99.

8 Mac Envelopes Plus

★★★★★

The price of this software is very high for an envelope-printing program, but it's quite a fair one, considering what you get. MacEnvelope Plus, intended for small businesses and group users who do substantial mailing, is the best envelope and mailing-list program available. It automatically prints bar codes, sorts and reports by zip code or carrier routes, and does everything necessary so that your mailings can qualify for the lowest bulk- and regular-mail rates.

Operation is fast and very, very slick. It includes predefined templates, which make label printing and changing sizes and types of envelopes (MacEnvelope Plus is also a great label printer) a snap.

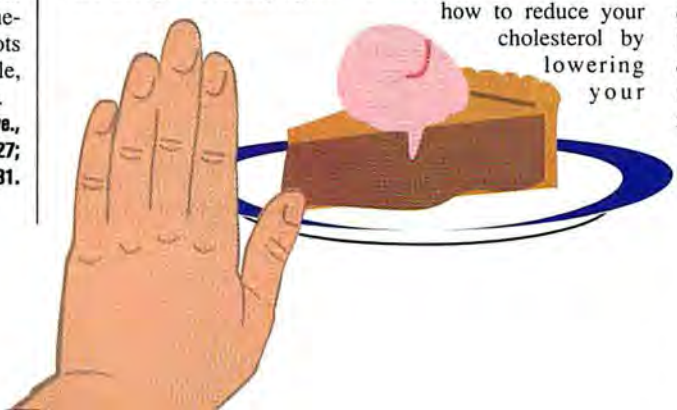
The name-and-address database is powerful and simple, a rare combination. Documentation is complete, and all the necessary extra fonts are included. Also included is a nice DA so you can print envelopes on the fly from within other applications.

Synex, 692 Tenth St., Brooklyn, NY 11215-4502; (718) 499-6293. Version 2.0. $350.

9 Take Control of Cholesterol

★★★½

Take Control of Cholesterol is one of a series of health- and food-related programs from Lifestyle Software Group. It's clearly a port from simpler interfaces (there are no graphics), but in spite of that, it's a good tool. It's designed to be used with *Eater's Choice*, a book that tells you how to reduce your cholesterol by lowering your saturated-fat intake.



The program sets up worksheets and has you fill out meal plans. It makes keeping track of your caloric intake easy. There are complete online instructions, and the food database is complete enough to cover the eating habits of most users.

Lifestyle Software Group, 63 Orange St., St. Augustine, FL 32084; (800) 289-1157 or (904) 825-0220. Version 2.0. $39.95.

BOBKER'S DOZEN

10 Igor ★★★★

Data lies at the heart of business decisions, and how you visualize, manipulate, and use it can critically affect your business success. Spreadsheets handle data adequately, but programs such as Igor do it better.

Igor uses what it calls wave input to speed up data entry. The program offers a pretty complete set of options and tests — although you don't get all the data-manipulation features of a statistics program, you can use Igor to mathematically define anything you want. A powerful macro language and easy command structure (with its own entry window) make repetitive tasks simple.

Igor's performance is very good, and printing quality and speed are excellent. You can import graphics as well as data, and the program supports color. The manual is adequate. To get the most from Igor, you should probably do some homework first. (For more information on tools for visualizing data, see "10 Reasons Why You Need a Charting Program," June '90, page 126.)

WaveMetrics, P.O. Box 2088, Lake Oswego, OR 97035; (503) 620-3001. Version 1.1. $295.

11 Nuts & HyperBolts ★★★½



Learning English grammar is no picnic. Nuts & HyperBolts is a series of large HyperCard stacks that help make that task more palatable. The stacks present a well-designed sequence, branch intelligently, and contain quite a lot of solid material.

The cards are a bit plain, however: There's no sound or animation to help hold your interest. It can be awkward to navigate around Nuts & HyperBolts, as the normal HyperCard menu commands and key equivalents have been disabled. You can work only via the mouse; there are no keyboard shortcuts — period. That means the only way to move around is by using the on-card buttons, making it difficult to go backward if you make a navigation error.

Sterling Swift Software, P.O. Box 43325, Austin, TX 78745-0009; (512) 280-2431. Version 2.0. $189.95.

12 SecureInit ★★★★

Sometimes I wish that a program did less than it does. The SecureInit utility is a case in point, although you can shut off its "extra" features. SecureInit is a well-thought-out program that can lock files and folders, make the System Folder invisible, erase files not on its user-specified approved list, lock disks after use, refresh (replace) specified files with clean copies after use, and password-protect everything. It can also purge files as a disk fills up, but this is too dangerous a feature to use in most cases. SecureInit is particularly good at resisting efforts to bypass it.



I'm very wary of most security software, but SecureInit is pleasantly well behaved. It's also tough, working exactly as the manual says and withstanding my attempts to break and bypass it. It's a bit much for home use, but I'd feel good if it were on all computer-lab and service-bureau machines; there would be far fewer virus infections and other problems around if it were. Users usually don't think about security programs as virus protectors, but they can be highly effective. While they can't warn you about previously infected files, they can help keep your currently clean files from being infected, giving you some peace of mind.

Direct Software, 1032 Irving St., Suite 513, San Francisco, CA 94122; (415) 347-1590. Version 2.2. $99.95.



13 Balance of the Planet ★★★★

Have no doubt: Saving the earth from its inhabitants is going to be tough, both in real life and in Balance of the Planet. The game is mechanically similar to Crawford's earlier classic, Balance of Power. It's difficult to win, but you should eventually be able to get positive scores and your awareness of environmental issues will be greatly enhanced.

Players set the basic bias of the game: It comes with biases ranging from pronuclear industrialist to extreme "green." Try the point of view you most disagree with — that's truly educational.

Balance of the Planet supports color, but it could use this feature better. There are lots of screens, but they sort of blend together after you use the program for a few hours. A little animation, which would make this already big package huge, would help a lot.

Accolade, c/o StarPat, 237 22nd St., Greeley, CO 80631; (800) 245-7744. Version 1.0. $49.95.

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Another reason the MacUser editors couldn't take their eyes off PLP II was its user-friendly front-panel LCD display. Who could blame them? With the simple push of a button, you can set your SCSI ID. Check your percentage of consumables used. Adjust your print density. And more. But what the MacUser editors especially liked was PLP II's "sleep mode," which automatically silences the printer when not in use.

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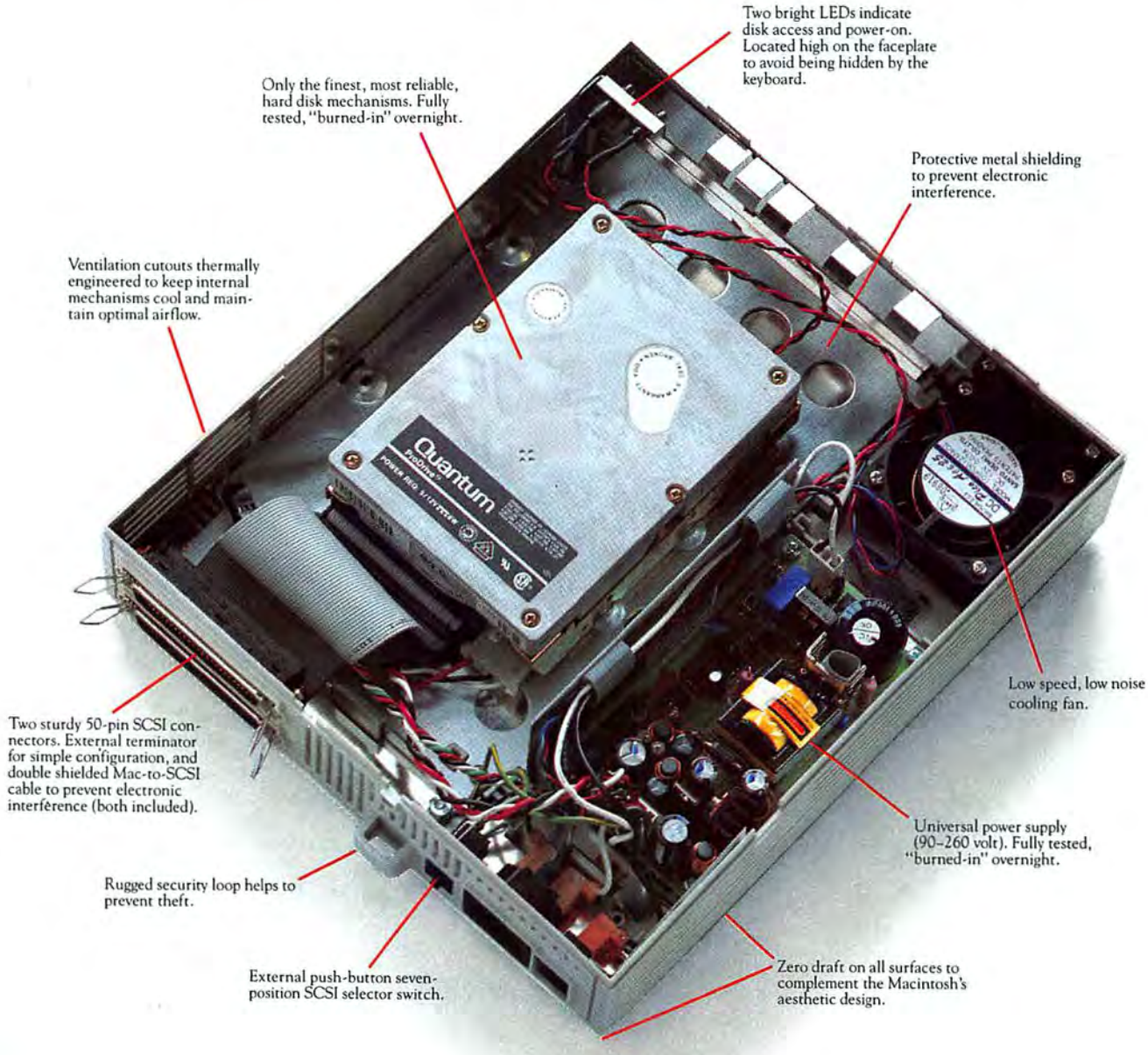
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DISPLAY SYSTEMS

Radius Pivot

Radius' combination portrait/landscape monitor is a turn for the better.



The Radius Pivot is a 2-bit black-and-white, or 4-gray, monitor that can rotate 90 degrees into either a landscape or a portrait orientation. The Radius hardware and software automatically rotate the pixels, so it can be used in either configuration without rebooting.

When Radius introduced the first full-page monitor in 1986, the timing was perfect. DTP was just taking off, and desktop publishers found that a full-page display was an invaluable tool. When other users investigated the situation, however, they found that a portrait display didn't suit their needs with applications such as spreadsheets, where the data was arranged primarily horizontally. This resulted in the popularity of two-page displays, which in turn proved to be overkill for both word-processor and spreadsheet-program users. What was needed was a monitor that could work in portrait *and* landscape orientations, and that's exactly what the Radius Pivot does.

TURN STYLE Using a combination of hardware and software, the Pivot lets you rotate the display 90 degrees into either a portrait or a landscape orientation. During rotation, the screen blanks out briefly, while Radius' rotation engine reorients the pixels correctly and automatically expands the window to the full-screen size. The unit is carefully balanced, so rotating it is both easy and safe — there's no danger of the monitor's falling over. All it takes is a gentle push or pull on the upper left and lower right corners.

The Pivot's screen is the same size as that of the Radius Full Page Display. It's a 2-bit black-and-white, or 4-gray, unit that can display up to 16 grays (with the extended memory installed), but as our gray-scale tests are designed for 8-bit systems, we opted not to test the Pivot's gray-scale performance.

In general, the Pivot's performance was good. The brightness was even across the entire screen, the transitions between our black-and-white test bars were sharp, and there was no noticeable jitter or noise.

But there were some problems. Although the focus was excellent in the center, the edges and corners were fuzzy. Our screen-geometry test showed some distortion, and in spite of the fast refresh rate (69 hertz), flicker was slightly noticeable when the brightness was set to maximum. The biggest problem, however, was glare. The Pivot's screen is extremely glare-prone, and Radius doesn't offer any antiglare coatings. Of all our tests, this was the only one that the Pivot failed outright.

PIVOT PRECAUTIONS The Pivot is unique, but it pays a price for this privilege. Because Radius' software isn't part of the Mac System, the Pivot's rotation capabilities can put you into some precarious situations. The biggest problem is with dialog boxes. When a standard dialog box is active, Radius' software disables the Dynamic Desktop feature and prevents you from performing the rotation unless you answer the dialog box first. Unfortunately, many programs (yes, quite a few of them are Microsoft applications) use nonstandard dialog boxes that the Pivot's software interprets as document windows. In these situations, pivoting results in a dialog box with the response buttons cut off, which prevents you from returning to the original orientation. Fortunately, the Pivot's software does have the ability to add different dialog-box types to its list of recognized boxes, so you can configure your work situation as needed.

Radius includes a booklet with compatibility information that you should definitely read before working with the Pivot. The guide describes some problem situations and specific application problems you should be aware of before doing a pivot. FileMaker II users should pay special attention to the information, as pivoting from landscape to portrait in Page Preview locks you into Page Preview and forces you to restart the Mac in order to proceed, which could possibly result in a damaged database.

THE BOTTOM LINE The Radius Pivot is a ground-breaking design that generally performs well. The rotation software and hardware work smoothly and elegantly, and our only reservations are about the fuzziness around the edges, the slight distortion, and the lack of glare protection — none of which are related to the monitor's pivot abilities. If you're trying to decide between a full-page and a landscape monitor, your decision doesn't have

Get Info

Radius Pivot ★★★★½

Manufactured by: Radius, 1710 Fortune Drive, San Jose, CA 95131; (408) 434-1010.

List Price: $1,690; display only, $995; SE/30 or Mac II interface card only, $695.

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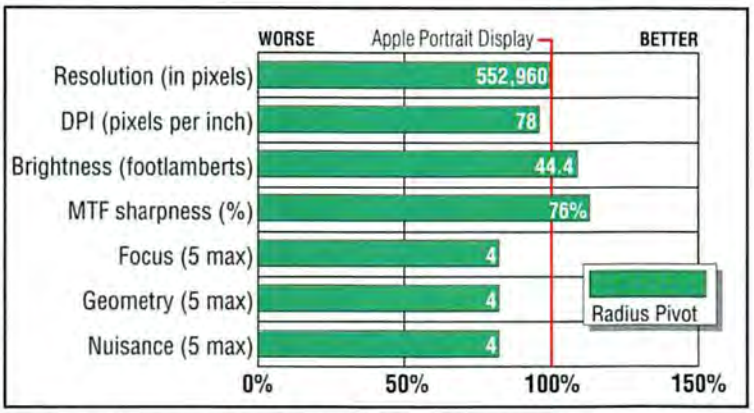
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MacUSER LABS How We Tested It

Using a Mac IIcx, we evaluated the Radius Pivot's resolution; dpi (dots per inch); maximum usable brightness; MTF sharpness; focus; geometry; and nuisance factors such as flicker, jitter, bandwidth, uniformity, and glare. Larry Pina's Test Pattern Generator and MacUser Labs' Canvas 2.1 files provided the test images. A custom-manufactured CCD device and digitizing oscilloscope tested MTF sharpness. For a more detailed description of the testing process, see "Grading the Grays," October '89, page 182.



The Radius Pivot monitor's performance is nearly identical to that of Apple's Portrait Display — with one big advantage: You can rotate it 90 degrees and use it as a landscape monitor too. The results here are normalized to the Apple Portrait Display, with the actual numerical values shown.

to be an either/or choice. Since the Radius' performance is very nearly equal to that of the Apple Portrait Display, if you like that monitor, you'd do well to consider the Radius. While the Radius may fall slightly short of the Apple in some respects, the Pivot's dual orientation may be more than sufficient compensation. The Radius Pivot is a good monitor that, with just a few improvements, could be a great one.

— Jeff Pittelkau and Russell Ito

UTILITIES

On Location

Finding files doesn't have to be like looking for needles in a haystack.

Q: What are the three most important things to consider when you buy real estate? **A:** Location, location, and location. This truism can apply to the real estate on hard disks too. If you spend more time searching for files than actually using them, look into On Location, a utility from ON Technology that helps the Finder find files fast.

ON'S PURPOSE As with a real desktop, the desktop interface doesn't cut it when the desktop gets too cluttered — whether it's because you have too many folders or because your folders have too many documents or because your folders have too many folders. On Location lets you search directly for any filename or — more significantly — for any text string *inside* a file.

If you're looking for a particular memo, for example, you can search for any piece of the filename you remember (*memo*, say), the recipient's name, or the date (more on dates in a moment). As soon as On Location finds the file — which is usually very, very quickly — you can view the contents (for most common document formats); open it in its native application; or copy, delete, rename, or move it. You don't have to wait for On Location to search the whole volume — it starts searching for target text strings as soon you launch it, modifying the result of the search with each character you type. It displays the results, sorted by filename, size, kind, or date of the last modification.

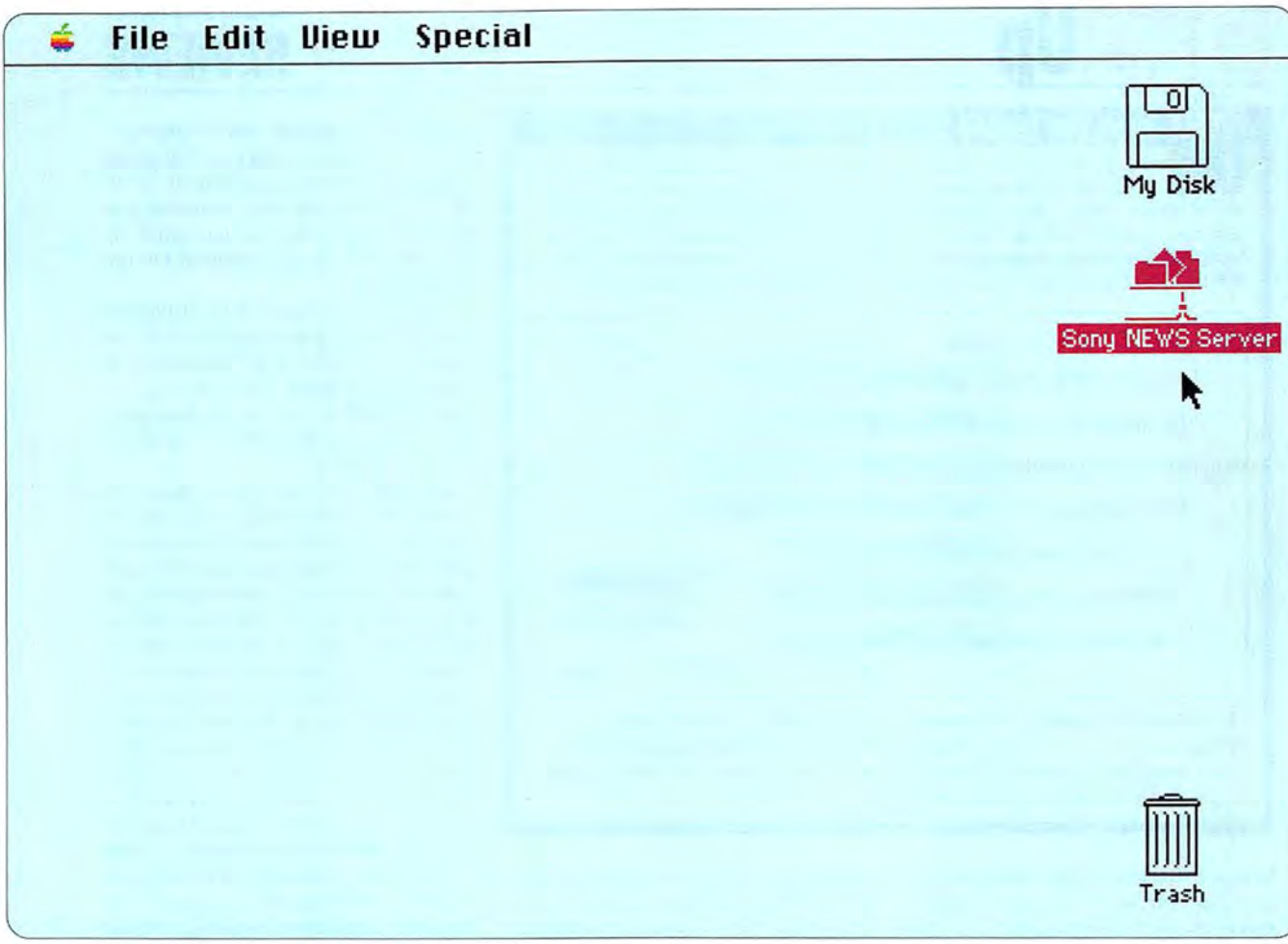
On Location is hardly the first utility to do any of this — Eureka and Find File can locate files, GOfer and CanOpener can search for text inside files, and programs such as DiskTop give you file-manipulation capabilities from a DA — so what's all the fuss about?

ON TIME Let's start with speed: On Location finds files nearly as quickly as you can type the filename on a small hard disk and in only a few seconds with larger volumes, including everything from CD-ROMs to file servers. The magic behind the blitz is its index. When you install On Location, you also have to index your hard disk (or whatever volume you want to be able to search). Building the index takes a while — anywhere from a coffee break for a small hard disk, to a long lunch hour for a full CD-ROM, to overnight for a monster hard disk or file server. The good news is that the indexes occupy much less hard-disk space than you might expect — only about 2 percent of the amount of data they're indexing, or about 20K per megabyte (obviously this can add up if you're indexing CD-ROMs on a hard disk). You can create separate indexes for separate volumes, and the indexes are separate from the volume they're indexing. So, for example, you can copy your file server's index to your Mac Portable and know exactly how to tell colleagues back at the office where to find all your files.

Most impressive of all, the indexes are automatically updated in the background, whenever you create or change a file's name or contents. (Although ON Technology has resolved many known prerelease conflicts among the updater INIT

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On Location ★★★★
Published by: ON Technology, One Cambridge Center, Cambridge, MA 02142; (617) 225-2545.
Version: 1.0.
List Price: $129.95.



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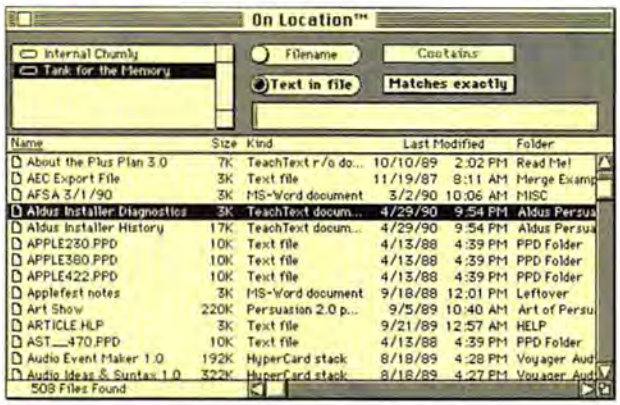


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On Location quickly finds filenames, as well as text strings inside your files, wherever they are on your hard disk, CD-ROM disc, or other volume. Once it's found them, it can also copy, rename, and move the files.

and other INITs, the manual warns of possible future conflicts; you can update manually if you experience any problems. If you have a noisy hard disk, you may find the automatic updating a little creepy as your unattended hard disk chugs away all by itself.)

ON THE EDGE On Location's interface is functional and intuitive, although it deviates in some ways from the standard Mac interface: It sports NeXT-like buttons with depth, has scroll bars in surprising places, and lacks some standard keyboard command equivalents and menu choices (such as Quit or Command-Q — you have to click on the close box to exit).

All text strings must begin with a letter; leading numbers and punctuation are ignored — which means, for example, you can't find dates in the format 1/1/90. The manual explains these limitations — On Location doesn't search for text strings shorter than three characters, for example — but the program does nothing to warn you that you're doing anything illegal or that the results of illegal searches are meaningless.

There's another problem with On Location. With a list price of $129.95, On Location is pricey for a one-trick pony. DiskTop, for example, does a lot more, for $99. The price includes a one-year money-back guarantee directly from the publisher, however, so you can decide for yourself if this one trick is worth that much to you.

THE BOTTOM LINE If you can't find things on your hard disk, On Location can make your life a lot easier — if you have a little extra RAM and hard-disk space. Although its quirks may slow you down every now and then, On Location can save you time and aggravation.

— Jon Zilber

GRAMMAR CHECKERS

MacProof and RightWriter

A pair of new grammar checkers challenge each other for the top slot, but Correct Grammar is still the winner.

For years there were no decent grammar checkers for the Mac; now there seem to be a couple of new ones every month. In addition to MacProof and RightWriter, there are Grammatik Mac and Correct Grammar (still the best) (see StartUp, June '90, page 59).

MACPROOF The latest version of MacProof, 3.2.1, deserves an award for comebacks. It's been around for a long time, but early versions weren't that useful and consequently weren't well received. This new version will please many people, however.

The program is a DA and is format-compatible with MacWrite 4.6 and 5.0, MacWrite II (although it must be used with care), Word 4.0 (but not 3.0 or earlier), MindWrite 1.0 and 2.0, and PageMaker 3. It worked well with all the programs and also with MultiFinder (at least 2 megabytes of RAM are required). MacProof also handles text files, and file handling is fine, although you must follow the precautions (well highlighted in the manual) if you use MacWrite II. It works on all Macs from the Mac Plus on, with good speed on a 4-megabyte SE and excellent speed on a 4-megabyte IIcx running Virtual.

Operation is simple. You select the text you want to analyze and run MacProof. After a few seconds, an excellent interactive grammar-checking window appears. This window is by far the best interface of any Mac grammar checker — it makes using MacProof easy and a pleasure.

MacProof has good performance, but its set of grammar rules set is somewhat skimpier than that of RightWriter and Grammatik Mac. There are no glaring errors — just an overall tendency to find simple things and ignore more-serious mistakes. Given that, the spelling-checker, capitalization, and double-word-elimination functions are superb (this can't be said for the competition).

MacProof offers a wide range of customization possibilities. With some simple changes, it can replace your spelling checker. You can add and select enough rules to raise it to any level you desire. To get the most from any grammar checker, you must be able to modify it to your taste. MacProof requires more modification than most, but once you've set it, it's excellent.

The program also has an excellent set of analysis tools. It can list sentences for separate analysis, highlight the first and last sentence of each paragraph, and perform several other useful analyses. All analyses can be printed out. MacProof is the weakest of the four checkers when it comes to document statistics, however. Although it does simple counts and averages, it isn't capable of calculating any reading levels.

The documentation is short for a grammar-checker manual, but it goes into enough detail that you can run the program and understand how it works. The paucity of rules partially accounts for the shortness of the manual.

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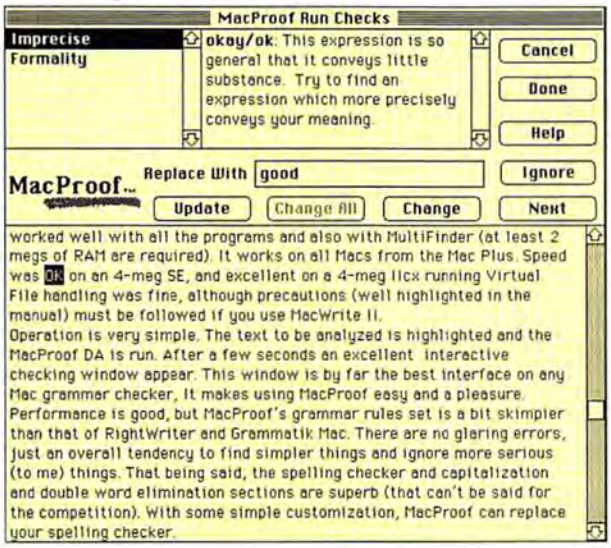
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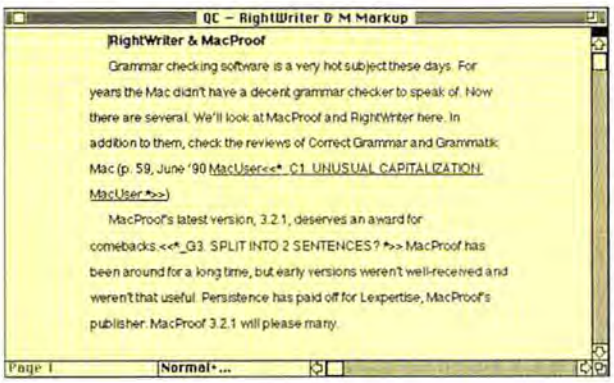
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MacProof is the latest version of one of the Mac's oldest grammar checkers. It's still a DA, and it's generally excellent — although expensive — but its rule set is skimpier than its competition's. You perform your check interactively, using this elegant window.



RightWriter is a port of a popular DOS grammar checker. This marked-up document was opened for entering changes in Word 4.0. RightWriter's comments are underlined, but it's hard to tell which passage the comments refer to.

RIGHTWRITER RightWriter works differently from every other grammar checker I've seen so far. It's a port of a popular DOS application, and it doesn't have an interactive mode. Instead, it produces a marked-up copy with embedded comments. You revise the marked-up document inside your word processor and then run it through RightWriter again to remove all the comments, leaving you with a clean copy. This process sounds far more awkward than it is, and it works correctly, smoothly, and quickly.

As RightWriter is an application, it can be used on any Macintosh with at least 512K of RAM. It works well with MultiFinder and is best used under MultiFinder in conjunction with your word processor. It's format-compatible with all versions of MacWrite (from 2.2 to 5.0), MacWrite II, Word 3.0 and 4.0, WordPerfect (1.0.0 to 1.0.4), WriteNow (1.07, 2.0, 2.2), and all text editors. It handled correctly all the files I gave it. It automatically makes working copies and names them as such, always leaving the originals intact.

I actually prefer to edit my own work with a marked-up copy, so RightWriter fits right in with my work style. Almost. There's one major problem. You can't easily tell — especially on a printout — exactly what parts of the text the comments refer to. If the relevant text were underlined or otherwise delineated, this would be the champ of grammar checkers. As it is, I find it nearly impossibly frustrating.

RightWriter is the strongest checker on grammatical matters. It is, as the others are, fully customizable, and you must take advantage of that ability to make the most of it. It automatically calculates indexes of readability, strength, and jargon level and also does a superb summary analysis. Its abilities in these respects far exceed all the competition.

You can set RightWriter to analyze at several different reading levels and for several different markets. Setting these controls correctly greatly reduces irrelevant comments, making editing much quicker and easier.

The manual is good, which is important, as you need to refer to it often for explanations of the too-cryptic embedded comments. The comments all include a code that tells you where you can find the explanation in the manual. Fortunately, the codes are individually indexed in the manual.

THE BOTTOM LINE Unlike other writing aids such as spelling checkers, grammar checkers require substantial preparation time before they can become truly useful. Since the way you write is highly personal, don't expect a program straight out of the box to suit your needs. Both MacProof and RightWriter can be customized, so be prepared to spend some time with them in the beginning.

MacProof and RightWriter are excellent grammar checkers that work in radically different ways. MacProof will be more useful to more people, but unfortunately, it is the most expensive grammar checker available, with a list price approximately twice that of the competition. If it were cheaper, it would be my first choice in almost all cases.

RightWriter is strong on checking but flawed on presentation. If it had some way of more clearly indicating what text its embedded comments referred to, it would be highly rated. Both programs are far better than Grammatik Mac, and they give Correct Grammar, currently the best of the genre, a run for its money.

— Steven Bobker

Get Info

MacProof ★★★★

Published by: Lexpertise USA, 175 E. 400 S., Suite 1000, Salt Lake City, UT 84111; (800) 354-5656.
Version: 3.2.1.
List Price: $195; French and German editions, $229 each.

RightWriter ★★★½

Published by: RightSoft, 4545 Samuel St., Sarasota, FL 34233; (800) 992-0244 or (813) 923-0233.
Version: 3.10.
List Price: $95.

UTILITIES

TScript for the Macintosh

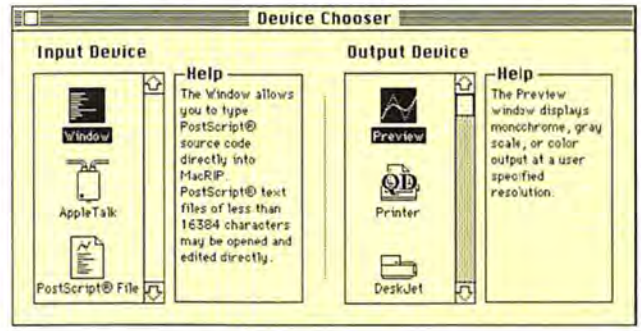
Freedom of Press' first rival is comparatively limited, but users on a budget may find it useful.

The most expensive part of a PostScript printer is not so much the hardware but the PostScript itself, because you have to pay licensing fees to Adobe. But software PostScript clones are popping up with considerable regularity. Freedom of Press was the first (and it's still the best), but it's a little too expensive for many users. A low-cost alternative, called TScript, may be the answer to a poor man's PostScript prayers — if that poor man is willing to suffer some severe limitations.

WHAT'S IN TSCRIPT Put simply, TScript, like Freedom of Press (see review, January '90, page 77), makes a variety of QuickDraw-based and other non-PostScript printers PostScript-compatible. This means that you can even print EPSF clip art on a lowly ImageWriter. If you use it with something more sophisticated, such as an HP LaserJet, the output should be nearly indistinguishable from what would shoot out of a LaserWriter Plus.

To use TScript, you need a hard-disk drive on which the program and nearly 700K of outline fonts can comfortably fit. The fonts are special clones of the Times, Helvetica, and Courier typeface families of the basic Apple LaserWriter.

The program's interface is simplicity itself. There are two windows. One displays any ASCII or text-only file (it must be 16K or smaller), and you use this window to type in your own PostScript code. The other window previews the code window or previews any EPSF or PostScript file. To preview the code window, you select the code (which must include a **showpage** command at the end) and issue TScript's Run command. You can convert any previewed file to TIFF, PICT, or MacPaint formats, or you can use the Print PostScript File command, select a file from a standard dialog box, and print it to the screen without actually opening it.



TScript (known as MacRIP in an earlier version) has its own Device Chooser for selecting the printer to which you want to send a PostScript file.

If you want to print a Word document or a graphic created in Illustrator, you must first capture the file's PostScript code to disk by clicking on the Disk File box in the LaserWriter Print dialog box (TScript comes with a special LaserWriter printer driver that contains this option). You then choose the icon of one of the printers TScript supports (Apple LaserWriter IISC, ImageWriter, HP LaserJet and DeskJet series, GCC Personal Laser and WriteMove printers, or any QuickDraw-based output device), and TScript processes the captured PostScript file and sends it to the printer.

If you are running under MultiFinder and are printing to an HP LaserJet, Canon, Mitsubishi, or Mirus device, you can also select TScript as a printer driver in the Chooser, which you select from the Apple menu. This avoids the file-capture step outlined above.

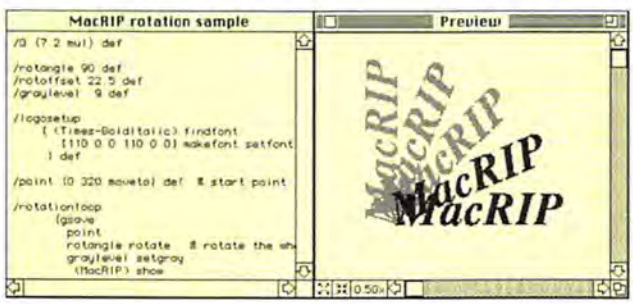
WHAT'S NOT IN TSCRIPT It has only two menus. That's it. No frills. No debugging tools. No way to cancel a Run command. And no batch processing of files, a feature that would certainly make the long waits more tolerable.

The documentation claims that TScript supports the entire Adobe type library if you use ATM. This is only partially true. Version 1.2 can preview a PostScript file with any Adobe font quite readily. But if you try to rotate, apply fills, or condense or expand a text string in any font other than Times, Helvetica, or Courier, the output can suffer from the jaggies.

TScript, while not blazing, is remarkably quick about its business. You'll have to wait more on a low-end machine such as the SE than on a IIcx, but I didn't find the latest version of the program obnoxiously slow. Users of the program's earlier incarnation (MacRIP) will be pleased with this accelerated version.

THE BOTTOM LINE Does TScript have anything going for it? Well, it's cheap — it costs a mere $145. Within the limitations detailed above, it has some usefulness and even greater potential. It may indeed be the answer to more than just a few prayers.

— Gregory Wasson



TScript, a new PostScript clone that makes non-PostScript printers PostScript-compatible, can also preview PostScript code and EPSF files on-screen.

Get Info

TScript ★★★½
Published by: TeleTypesetting Co., 474 Commonwealth Ave., Boston, MA 02215; (617) 734-9700.
Version: 1.2.
List Price: $145.



Mitch Kapor, chairman, ON Technology.

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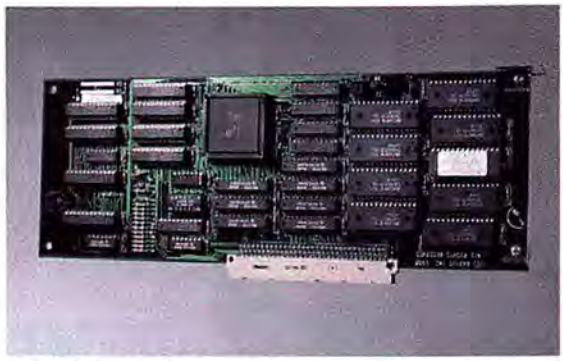
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ACCELERATORS

Radius QuickCAD Graphics Engine

If you use one of the two applications it supports, Radius' accelerator is worth investigating.

CAD radius Waiting for your drawing window to update, zoom, or scroll is not only irritating but also unproductive. A skilled architectural-engineering drafter's time is worth a lot per hour, so anything that promises to accelerate CAD graphics deserves serious consideration.



The Radius QuickCAD Graphics Engine can increase the Mac's redrawing speed to 10 to 30 times that of a Mac II. Unfortunately, right now it works with only two programs: AutoCAD and VersaCAD.

QUICKER CAD The Radius QuickCAD Graphics Engine is a NuBus card that takes a specialized approach to the problem of increasing the Mac's redraw speed. It uses a 10-megahertz RISC chip (the VLSI Technology VL86C010) as a display-list processor, backed by 256K of high-speed static RAM. A display list stores the coordinates and attributes of each object, in order of creation. This was the earliest kind of graphics software, and it still forms the basis of many mainframe and minicomputer CAD programs and their descendants on desktop computers and workstations. The original display-list technology was relatively slow in redrawing and updating the screen, but it made very efficient use of memory and CPU cycles, back in the days when those things were precious.

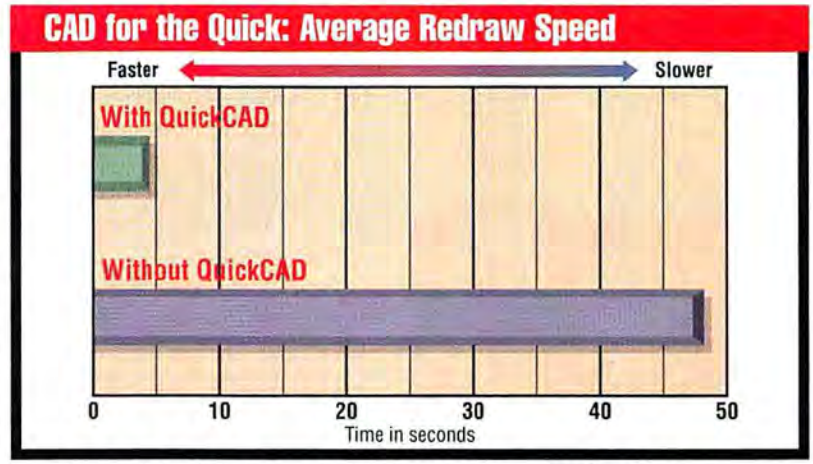
Only two Mac programs — AutoCAD (release 10c5) and VersaCAD (version 2.2) — currently use integer-based display lists in a way that QuickCAD can access directly. Some programs that use a floating-point display list (notably MacBravo) do not benefit from QuickCAD.

In design and workmanship, the QuickCAD board reflects Radius' usual high standards. Most of the chips are socketed, and there are no jumpers or DIP switches to worry about. The card requires no cables or video-monitor connections — it simply occupies its NuBus slot, drawing 2 amps at +5 volts. The package includes a conductive wrist strap that helps minimize the risk of damage from electrostatic discharge during installation or removal. An illustrated booklet provides clear instructions for installation, operation, and troubleshooting.

QuickCAD is designed to work with Radius monitors and video cards to accelerate standard Mac QuickDraw graphics as well as display-list CAD software. QuickCAD follows Apple's standards for 32-bit QuickDraw, ensuring compatibility with future System software. Although QuickCAD also works with Apple's 8-bit-video card, in this configuration, it provides only display-list — not QuickDraw — acceleration, and this will continue to be the case with Apple's new video boards.

Two startup files control QuickCAD's operation. An elegant little Installer program automatically copies these INITs into your System Folder. The QuickCAD INIT provides a simple cdev with a Master Switch and a Caps Lock Enable/Disable switch that lets the Caps Lock key toggle the board on and off. This design choice was unfortunate, because the Caps Lock key is used for other things in many Macintosh programs and forgetful users can inadvertently disable the board by leaving this key in the wrong position. The QuickColor INIT, which you install only if a Radius video board is installed in your Macintosh, provides QuickDraw acceleration.

A FAST PERFORMER QuickCAD's performance depends on the software you're using and your drawing's complexity. Radius claims QuickCAD can boost display speed to 10 to 30 times that of a Mac II. With an 8-megabyte Mac IIcx, an 8-bit Radius color card, and a 19-inch Radius



In my tests with AutoCAD, Radius' QuickCAD accelerator increased my Mac IIcx's average redraw speed by a factor of 11.

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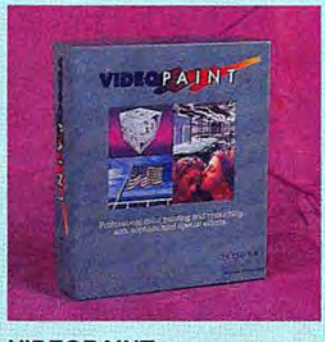
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- Pagemaker. 522
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- Template Software for QuarkXpress, PageMaker, Style, Ready Set Go .. 25
- Claris Smart Forms 29

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- DiskExpress II 54
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ASD SOFTWARE
- Fileguard 68

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- AshlarVellum 695

BLYTH SOFTWARE
- Omnis 5 355

BRODERBUND
- TypeStyler 117

CAERE
- OmniPage 529
- OmniSpell 68
- OmniDraft 68

CE SOFTWARE
- Quickmail 10 User 298
- QuicKeys 64
- DiskTop 4.0 64

CENTRAL POINT
- Copy II Mac 22
- Mac Tools Deluxe 72

CENTRON SOFTWARE
- Casino Master. 38
- Casino Master Color 45

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- Rags to Riches 3-Pack 188

CLARIS
- MacWrite II 142
- FileMaker II 209
- MacDraw II(including ATM) 275
- ClarisCad 559
- SmartForm Designer 279

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- UltraPaint 119

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- Smalltalk/V Mac 119

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- Cliptures Vol 1 or 2 69
- MacGallery 26

ELECTRONIC ARTS
- Studio 8 289
- Studio 1 92
- Disk Tools Plus 30
- Thunder II 52

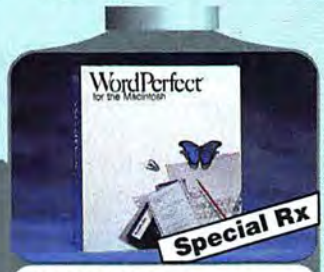
EMERALD CITY SOFTWARE
- SmartArt 1,2,3 or 4 82

FIFTH GENERATION
- FastBack II 105
- DiskLock 112
- Suitcase 44

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- Language Master 57

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- Kanjimaster 89
- Word Torture Spanish, Russian, French, Italian & German 29
- Verb Tutor for above languages 39
- Tense Tutor for above languages 39

INFORMIX
- WingZ 238

INNOVATIVE DATA DESIGN
- Dreams 315
- MacDraft 185

INSIGHT DEVELOPMENT
- MacPrint 94

INSIGNIA
- Soft PC 242

LANGUAGE SYSTEMS
- Fortran with MPW 398
- Wild Things 119

LAYERED SOFTWARE
- AtOnce 275
- Insight Expert per module 388

LETRASET
- ImageStudio 269
- DesignStudio 589
- FontSudio 455
- ColorSudio 1566

LEXPERTISE
- MacProof 108

MACROMIND
- Macromind Director. 435
- Accelerator 125

MAGIC SOFTWARE
- AutoSave II 24
- BackMatic 48
- POWERicons 38

MAGNA
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- Empower II 213

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- Enhance 235

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- Word 4.0 243
- Excel 243
- Help for Excel with Excel purchase .. 25
- Power Point 243
- Microsoft Office 522

MICROSPOT
- MacInteriors 179
- MacPlot Pen Plotter Pro 269

NEW HORIZONS
- Wordmaker 63

NOLO PRESS
- For the Record 28
- WillMaker 30

ODESTA CORPORATION
- Double Helix 299
- GeoQuery 179
- Data Desk Professional 259

OLDUVAI
- Videopaint 269
- Read It 242
- MultiClip 49

PANTONE
- Process Color Imaging Guide 53

PARACOMP
- Swivel 3D 289
- Model Shop 369

PARAGON
- Nisus 238

POWER UP
- Address Book Plus 51
- Address Book Plus with Binder 75
- Calendar Creator 35
- Fast Forms 86

PREFERRED PUBLISHERS
- Exposure 50
- Vantage 50
- DAtabase 66

PRE-PRESS TECHNOLOGIES
- SpectreSeps - Quark or Pagemaker 195
- SpectreScan 299

PRO PLUS
- Wall Street Investor 375

QUARK
- QuarkXPress 455
- QuarkStyle 166

REFERENCE SOFTWARE
- Gramatik Mac 49



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SENSIBLE SOFTWARE
- Sensible Grammar 50
- Book Ends 50

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- Super Paint 2.0 123
- Digital Darkroom 244
- Supercard 185

SOLUTIONS INTERNATIONAL
- Smartscrap 46
- SuperGlue II 59
- The Curator 69

SOFTWARE VENTURES
- Microphone II 209

SOMAK
- ScriptEdit 46
- Sharpen Up 57
- CD Rom Clip Art Vol 1 or 2 57

SPINNAKER
- Publisher II 86
- Hidden Agenda 34
- Sargon IV 22
- Plus 111

STUDIOTRONICS
- Colorset 209

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- Pixel Paint 226
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- Superlaser Spool 88



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- Think C 4.0 159
- Think P 159
- SAM 63
- SUM II 104
- More 262

SYMMETRY
- Acta Advantage 64
- KeyPlan 235
- HyperDA 46

SYNERGY
- Kaleidagraph 155
- VersaTerm-Pro 169

TACTIC SOFTWARE
- ClairVoyant 45
- Icon It! 45
- Sound Clips 45
- ArtClips 45
- ArtFonts 45
- FontShare 125

TEKNOSIS
- HyperBasic 65

TELETYPESETTING
- TScript 89

TIMEWORKS
- Publish it! Mac 219
- Publish it! Mac Easy 109
- Hyperworks Organizer 56

TOPS
- Network Bundle for MAC 179
- Network Bundle for DOS 149
- Network Bundle for DOS 10-Pack .. 625
- TOPS Flashcard 156
- Teleconnectors 26

TRAVELING SOFTWARE
- LapLink Mac Connectivity Pack 111
- LapLink Mac Network pack 179

T-MAKER
- Write Now. 115
- ClickArt ..... From 33

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- PhoneNET PLUS 31
- PhoneNET PLUS (10 Pack) 219
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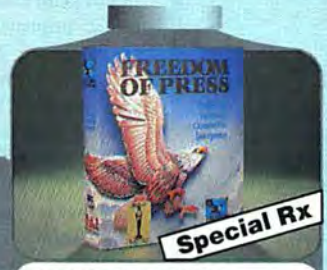
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Up to Date

Changes New and Noted

MACDRAFT 2.0 is the first major upgrade of this venerable drawing package. Among the new features are 32-bit-color support; Bezier and spline curves; unlimited layers; color, font, size, and style control over individual characters in a text block; text rotation in increments of less than one degree; custom line styles; and a snap-to-object option. Version 2.0. $299; upgrades, $29 if version 1.2b was purchased after April 1, 1990, or $69 if purchased prior to April 1. Innovative Data Design, 2280A Bates Ave., Concord, CA 94520; (415) 680-6818.

SWIVEL 3D PROFESSIONAL is the next generation of Swivel 3D, Paracomp's popular 3-D-modeling program. Swivel 3D Professional is a 24-bit-color program, but for users without 24-bit color, Paracomp will continue to support the original Swivel 3D. Swivel 3D Professional's new features include full-screen display, the ability to export to Pixar's RenderMan as well as in DXF format, smooth (or Phong) shading, and up to eight independent light sources with intensity and reflectance controls. $695; upgrades, $95 if Swivel 3D version 1.1 was purchased before July 1, 1990, or $200 if version 1.1 was purchased after July 1. Paracomp, 123 Townsend St., Suite 310, San Francisco, CA 94107; (415) 543-3848.

DELTAGRAPH, DeltaPoint's Eddy-award-winning charting program, is now in version 1.5. The new version includes more than 25 new features, such as additional chart types and data functions, multiple chart overlays, superscript and subscript support, PostScript dashed lines, and the ability to import CA/Cricket Graph data files directly. Version 1.5. $195; upgrade, free to registered owners. DeltaPoint, 200 Heritage Harbor, Suite G, Monterey, CA 93940; (408) 648-4000.

MORE 3.0 is the latest incarnation of Symantec's outliner/presentation package. The company has beefed up MORE's presentation capabilities considerably with the addition of the Chart Tutor, a task-oriented guide to creating effective presentations; a text ruler for improved word-processing capabilities; the Library Browser for previewing layouts prior to selecting them; and 24-bit-color support. MORE 3.0 also includes MORE Graph, a dedicated financial-charting application. Version 3.0. $395; upgrades, $50 to registered owners of MORE II or free if MORE II was purchased after March 10, 1990. Symantec, 10201 Torre Ave., Cupertino, CA 95014; (408) 253-9600.

color monitor, I found the average speed for creating two complex AutoCAD drawings was just over 11 times as fast (see the "CAD for the Quick" chart).

You can get faster computer graphics in many ways. The most expensive way is to buy a faster computer or an accelerator board that boosts the CPU to a higher clock rate. Another approach (seen in Apple's new Macintosh Display Card 8•24 GC video card) is to accelerate *all* QuickDraw operations with a graphics coprocessor. Radius QuickCAD combines the advantages of both approaches — at least for the specialized category of display-list CAD software. The QuickCAD RISC processor can compute six million instructions per second, with a data-transfer rate of 32 megabytes per second — seven times the normal transfer rate of a Mac II. The RISC processor even has its own customized on-board multitasking operating system that mediates the bus control between the Mac CPU and QuickCAD's RISC chip and keeps them from stepping on each other.

THE BOTTOM LINE For users who have already made an investment in Radius monitors and one of the two display-list CAD programs, buying a QuickCAD board is an economical way to get a dramatic improvement in overall system performance. Those who use one of these programs with an Apple video card and monitor will still get some benefit. If Radius can persuade additional CAD-software publishers to modify their applications to support integer display-list processing, this specialized board could be a serious contender in the market for Mac performance enhancers. Radius says a half-dozen applications will support QuickCAD by the end of the year, so my advice is to wait if you can. [*As we went to press, Ashlar announced that it will be modifying version 1.1 of its Vellum software to work with QuickCAD. — Ed.*]

— Mike Markowitz

Get Info

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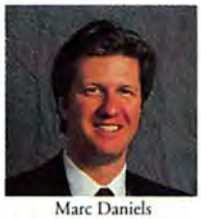
CheckFree liberates Mac users from the drudgery of paying bills.

One of the greatest disappointments of the computer revolution is that the technology does not deliver on the promise of a paper-free office or home. Wherever you go, computers seem to be generating more paper. Checkfree Corp. is hoping to change this with the introduction of a Mac version of CheckFree, a system that pays bills electronically by transferring funds from your bank account directly to the payee.

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Beyond paying bills electronically, CheckFree maintains your check register


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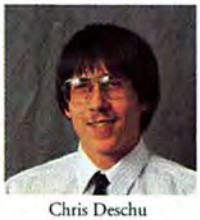

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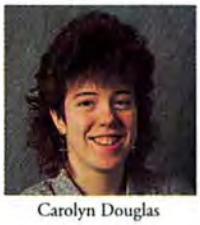

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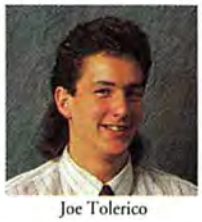

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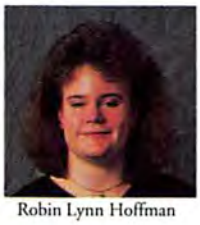

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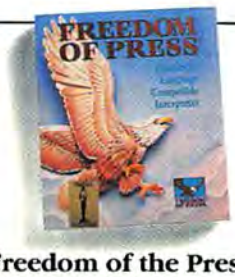
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on the Macintosh and allows for the addition of manually written checks. Finally, CheckFree creates budgeting reports to show variances in month-to-month spending in various CheckFree-defined categories. CheckFree users can also export all register data to MacInTax for tax filing.

Signing up for CheckFree involves filling out a form and mailing it to Checkfree with a voided check. The company claims that its turnaround time for new applications is about two weeks, although some recent applications have taken more than a month. As of this writing, CheckFree charges $9 for the first 20 payments per month and $3 per 10 payments above 20.

CHECKING IT OUT When you launch CheckFree, it displays an electronic bankbook detailing all past and scheduled CheckFree payments. Payments in bold indicate future or recurring payments. For recurring payments, such as fixed-amount auto loans, CheckFree has several recurring-payment plans, such as paying the merchant monthly on a given day. You can define the number of payments in the future or continue the payments until you notify Checkfree to do otherwise.

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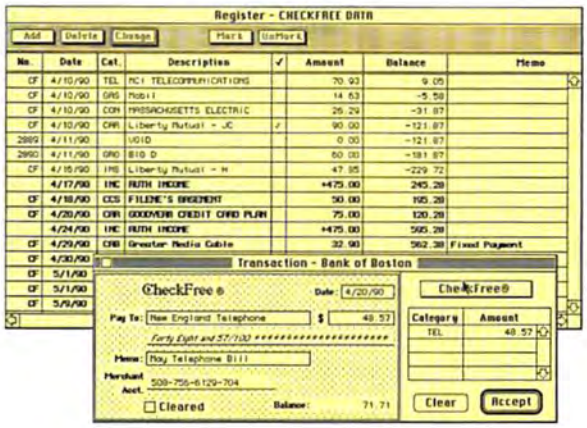
For photographic-quality scanning, there's the HP ScanJet Plus scanner. Combine that with one of HP's high-quality printers. The DeskWriter, the new LaserJet III, the LaserJet IIP, or the LaserJet IID. HP even has color printers. The PaintJet and the PaintWriter XL.

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To pay a merchant with CheckFree, you fill in a stylized check. The register behind the check shows future and recurring payments, and the check marks indicate payments that have been reconciled.

CheckFree then displays a stylized version of a check for you to fill out. After you've entered all payments, your last step is to send the information to Checkfree via the Send to CheckFree command on the Actions menu. This step requires a 1,200- or 2,400-bps modem and a call to a local or toll-free number.

In one year of using the PC version and three months of using the Mac version, I have experienced only one CheckFree processing error. Unfortunately, this was my mortgage payment of $700, which was two weeks late. Checkfree's merchant-relationship group was able to convince the bank that I'd intended to pay on time, however, and the bank waived the late fee (which Checkfree otherwise would have paid).

THE BOTTOM LINE The CheckFree software works well — although it's quirky under MultiFinder — and the service is a great convenience. The only areas that need improvement are the manual (which doesn't contain even a single screen shot or an index), customer service (which seems to be vastly understaffed, judging by the time I spent on hold), and acceptance of electronic bill paying among merchants and other payees —ultimately the most limiting factor for CheckFree.

— Jeffrey A. Steinberg

Get Info

CheckFree ★★★½

Published by: Checkfree Corp., 720 Greencrest Drive, Westerville, OH 43081; (614) 898-6000.

Version: 1.5.

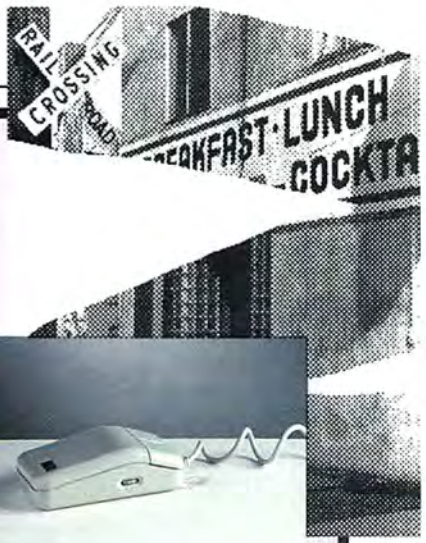
List Price: $29.95.

to your Macintosh.



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StartUp



BetaWatch

Products on the Horizon

Studio/32 is the long-awaited 24-bit upgrade of Studio/8, Electronic Arts' 8-bit-color paint program. In addition to 32-bit-color support, Studio/32 includes anti-aliasing tools, four-color separations, support for the Pantone color-matching system, an independent text layer for PostScript-quality output, unlimited layers, editable Bezier curves, multiple-document support, and 3-D perspective.



$695; upgrade from Studio/8, $150. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404; (415) 571-7171. ETA: Summer 1990.

PageBrush is the most unusual input device we've seen in a long time. It's a combination optical mouse and hand-held scanner from Mouse Systems, the manufacturer of the A+ optical mouse. Using an acetate grid, PageBrush can scan an image and automatically stitch the scan passes into a single image of any size. If you move the scanner too quickly across the graphic, all you need to do is back up and scan that section again. The scanner includes variable contrast control, so you can adjust the contrast level on the fly and vary it from one portion of the scan to another. PageBrush scans at resolutions from 75 to 300 dpi, with up to 64 shades of gray, and when it's not being used as a scanner, it serves as an optical mouse.

$795. Mouse Systems, 47505 Seabridge Drive, Fremont, CA 94538; (415) 656-1117. ETA: Fall 1990.

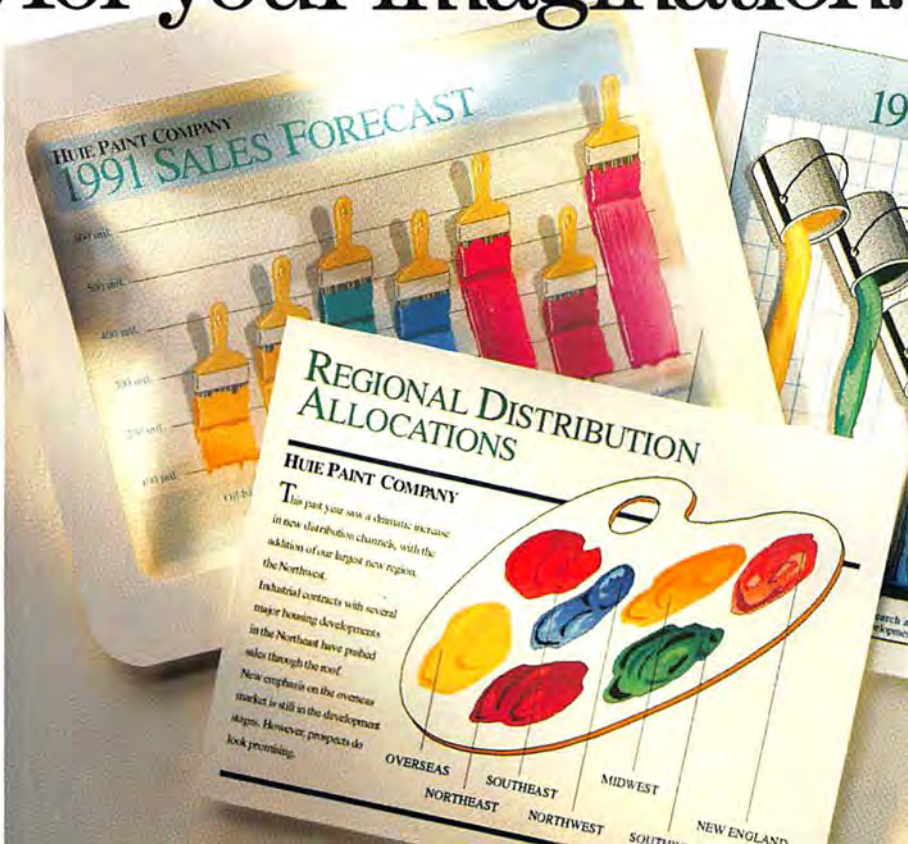
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There is a better way.



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BUSINESS ACCOUNTING

Accountant, Inc. Professional

Softsync's small-business-accounting system is a worthy contender in a crowded field.

With every passing month, the small-business-accounting segment of the market gets more crowded. The latest entrant, Accountant, Inc. Professional from Softsync, is an integrated general-ledger, accounts-receivable, accounts-payable, payroll, inventory-management, and project-management system.

Its entry format is highly stylized and streamlined, and the screens are similar to the input documents that you would normally use with an accounting system, such as invoices, purchase orders, and receipts. System navigation is easy and intuitive.

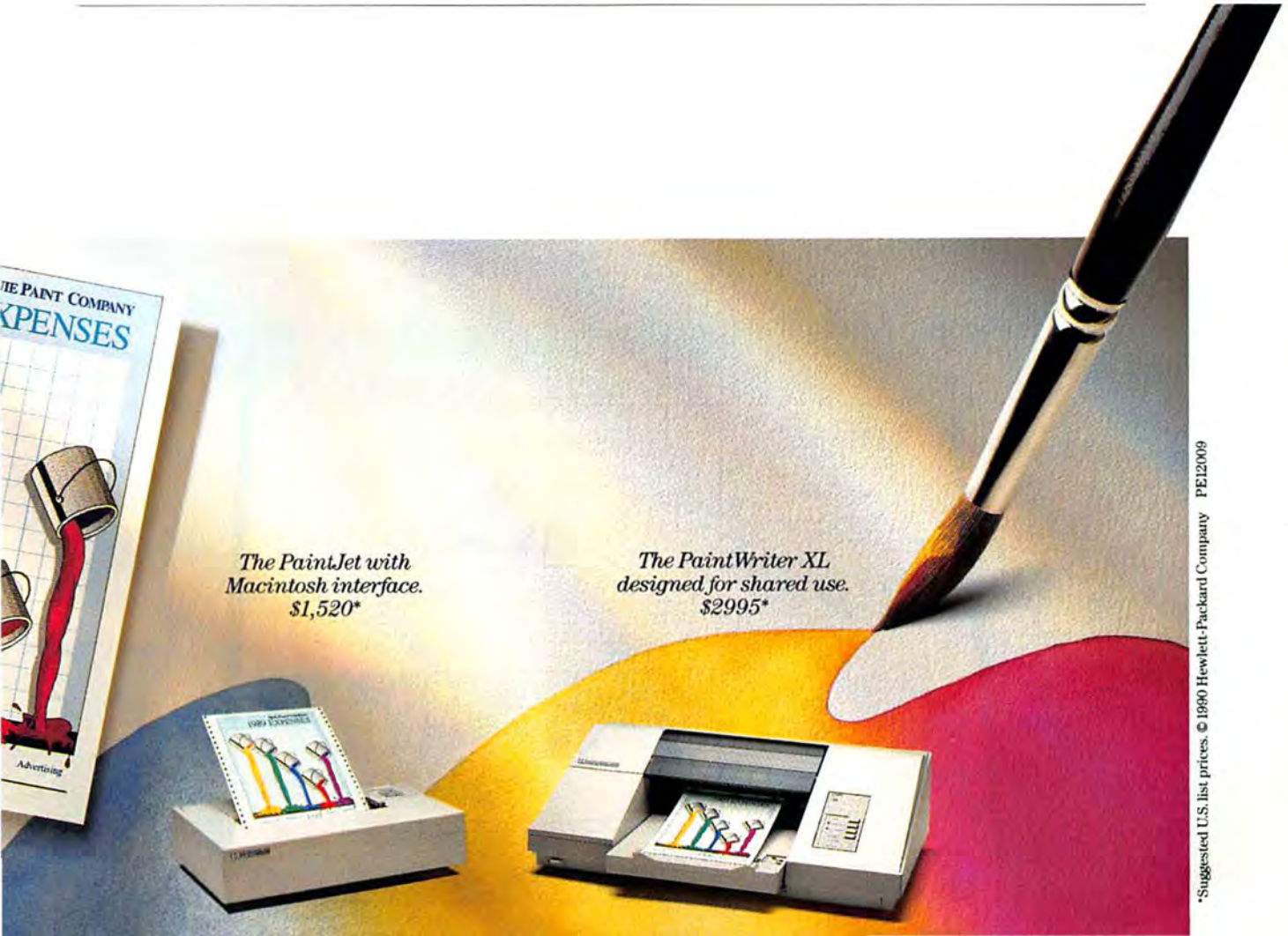
The system's design is forgiving even if you don't have a detailed knowledge of accounting, but some basic knowledge of accounting mechanics is required. Accountant, Inc. Professional is based on double-entry-bookkeeping principles, so if you're familiar with manual double-entry bookkeeping, the program is a snap.

Installing the program is easy. HyperCard tutorial stacks and sample company setups get you started. The documentation is well indexed, well laid out, and a valuable tool that won't collect dust on the shelf.

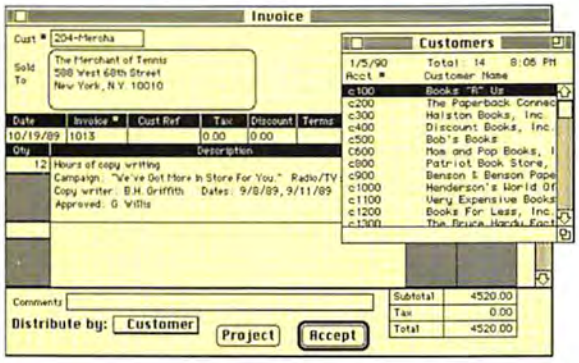
Accountant, Inc. Professional was designed for use in several industries and business types, including service organizations. Its flexible chart of accounts lets you customize it for almost any setting, although it's not suitable for write-up business or multicompany consolidations.

The system's reporting module provides more than 100 financial reports and analyses. Rather than offer a report writer, Accountant, Inc. Professional offers an export capability so you can analyze your accounts in a spreadsheet.

You can password-protect every menu command. Passwords can be assigned at the employee level, and each employee can be granted unique access. The program can also generate an audit trail so you can keep track of your activities.



StartUp



Accountant, Inc. Professional is an integrated small-business-accounting package that's a solid entry in an increasingly crowded field. It's designed for use in a variety of businesses, including service-oriented companies, as you can see here.

MODEL MODULES The general ledger provides automatic account updating. The chart of accounts is flexible and offers user-defined names, with up to 13 open periods kept on-line.

In accounts receivable, you can define multiple sales-tax tables. Credit memos are linked directly to inventory, and each item on an invoice can have up to four description lines. The system automatically generates an aging schedule for accounts receivable. The accounts-receivable module can also handle time billing for professional-services organizations. It can produce customer mailing labels as well as automatically generate overdue-account notices.

The accounts-payable module generates checks as well as remittance advice. The payables system produces an aging schedule that is especially helpful for improving small-business cash flow. Purchase orders in the system track inventory items, and the system also generates a purchase and expense analysis.

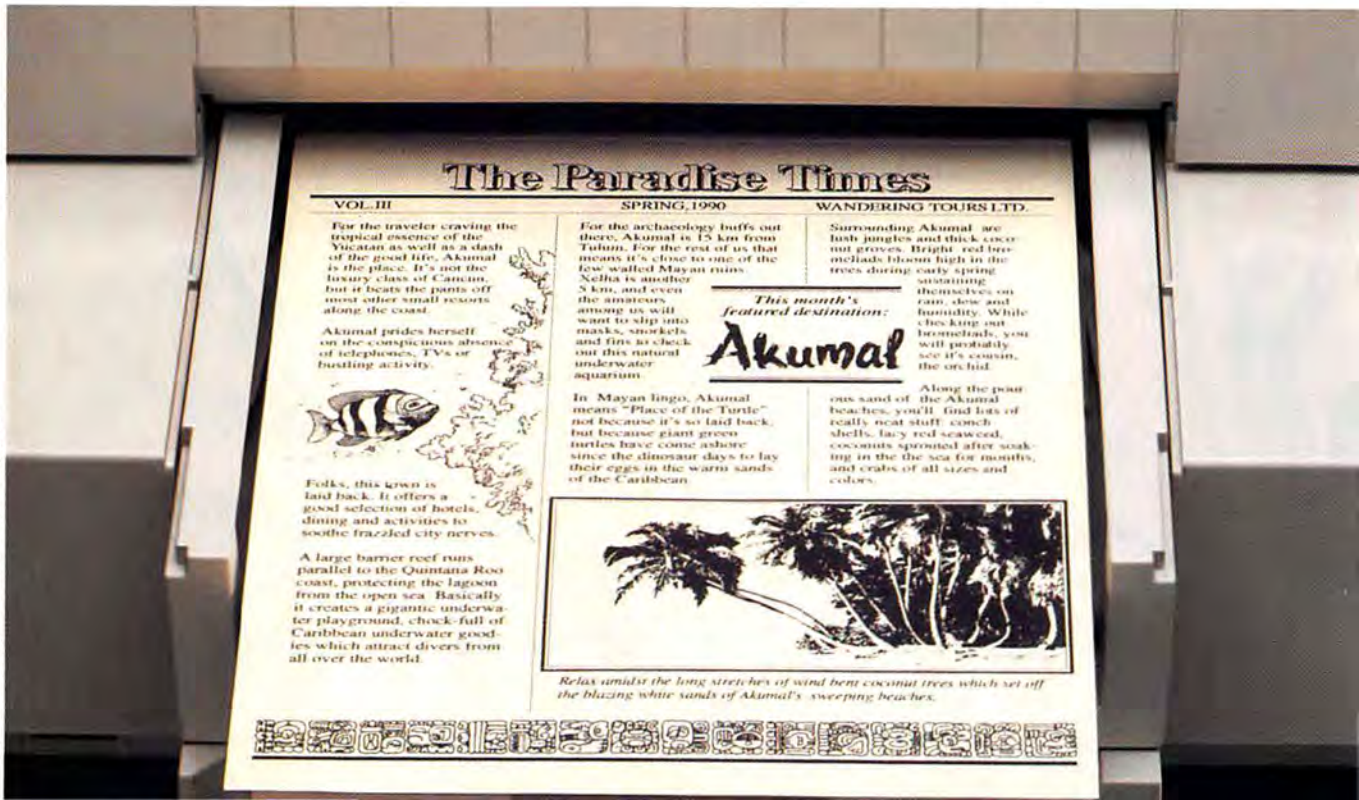
The inventory system tracks parts and assembled items. Back orders are automatically generated, and a reorder list is available at any time. Inventory valuation can be based on weighted average or last cost.

The payroll system can handle variable payroll periods. It supports nine income categories and works with both hourly and salaried employees. It can also automatically generate federal forms 940, 941, and W2 and provides for up to 50 user-definable deductions.

Accountant, Inc. Professional can capture income and expense information related to projects or jobs and can produce specific management reports. It also lets you distribute salaries to projects and can create automatic profitability and margin reports for each project.

THE BOTTOM LINE Accountant, Inc. Professional has done a creditable job of establishing itself as a contender in the increasingly crowded small-business-accounting market. The system offers a

With the HP DeskWriter, you can



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great deal of functionality, a high degree of conformance to the Mac interface, and solid accounting and bookkeeping fundamentals. Its closest competition is Teleware's M.Y.O.B. (Mind Your Own Business) (see "Critical Accounts," May '90, page 156). M.Y.O.B. is only a third the price, although adding the separate payroll program makes the prices more even. Nonetheless, Softsync's program is worth considering if you want to do all your accounting in one package.

— Ken Landis

Get Info

Accountant, Inc.
Professional ♟♟♟♟
Published by: Softsync, 162 Madison Ave., New York, NY 10016; (212) 685-2080.
Version: 1.01.
List Price: $299.95.

MUSIC

Practica Musica and Harmony Grid

Used together, these two music programs offer an excellent balance of theory and experimentation.

Harmony is the underlying structure, progression, and relation of chords that governs most Western musical composition. It is also the bane of music majors and precocious amateurs.

Learning the basic vocabulary of any discipline is not as exciting as practicing the real thing. Experimenting by scooting your mouse about, hearing pleasing tones, and seeing graphic representations of music is a lot more interesting than memorizing those annoying half and whole steps that make up scales and chords. But whether experimentation or pure theory is appropriate for you depends on what your musical needs are and where you plan to go from there.

Practica Musica, from Ars Nova, is strictly old school: solid basic harmony structured into games (read: drills). Sure, some cute touches have been added, such as the sound of applause on successful completion of an activity and words of encouragement when you are doing well.

have it all. (But keep it to yourself.)



The HP DeskWriter printer puts laser-quality printing right at your fingertips.

With a small size and a $1,195* price tag, the DeskWriter printer easily fits on your desk and in your budget. And its advanced 300 dpi inkjet technology lets you print sparkling text and detailed graphics.

The DeskWriter is also designed for easy use with your Macintosh, and has both serial and Apple Talk interfaces. It even includes scalable and outline fonts. Combine that with the DeskWriter's whisper-quiet operation, and keeping it to yourself will be that much easier. So call **1-800-752-0900, Ext. 1004** for your authorized HP dealer.

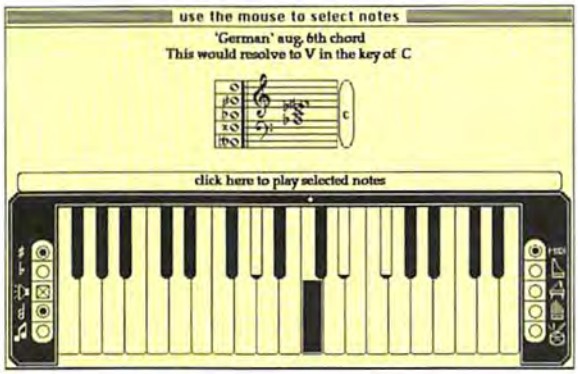
There is a better way.

HEWLETT PACKARD

But all in all, it's still Harmony 101.

Harmony Grid from Hip Software is an alternative approach to learning the basics of harmony. Tones are represented on a grid so that scales and chords can be seen as repeating patterns. You play these tones by moving the mouse over the grid, which provides the visceral pleasure of musical improvisation without any training or technique.

PRACTICA MUSICA On booting Practica Musica, I felt suddenly transported back to the days of first-year harmony. There they are: the keyboard, the staff, the dreaded German augmented sixth chord . . . the only thing missing is the gleam of my professor's shining pate behind the Steinway. And, as in first-year harmony class, the lessons here are organized into 11 activities, ranging from simple pitch reading and writing to scales, modes, interval recognition, chord spelling, and ear training. Each activity is then broken into four levels of difficulty. For each "game," you earn points for correct answers and lose points for mistakes. As you master each level, you garner the coveted round of applause and a mark is made on your overall progress report, indicating successful completion of that game. As many as four people can keep individual progress reports.



Practica Musica is a classic harmony-theory course done as a series of games. Through enharmonic spelling, the program recognizes this seemingly innocent major minor seventh chord as the dreaded German augmented sixth chord.

Input is available either through mouse clicks on the graphic keyboard and staff or through an external synthesizer via MIDI. If you have access to a MIDI device, use it. Some of the activities are based on speed, and mouse input earns you only weak praise and few points. Also, through MIDI, you have the option to use your synth's sounds rather than the three programmed sounds (piano, organ, and harpsichord) played through the Mac's internal speaker and output jack.

Although this program is aimed at users new to harmony, it has enough activities to challenge even seasoned musicians. For those classically trained and venturing into the world of jazz, an ear-training activity is supplied that lets students work

With the HP ScanJet Plus, you've

The HP ScanJet Plus scanner provides 8-bit photographic-quality scanning.

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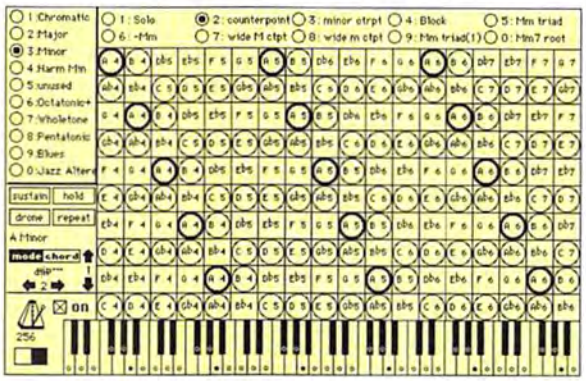
For all its amenities, ease of use, good image quality, and low price, *Publish!* recommends the HP ScanJet Plus as their "Best Buy."

only on user-selected chords. This is wonderful practice for recognizing 9th, 11th, and 13th chords.

The Practica Musica package also includes a book, *Windows on Music*, that — although no substitute for Piston (the bible of first-year music students) — provides a good introduction to music theory and supplemental material not covered in the program.

HARMONY GRID Every so often, someone tries to build a better mousetrap and, having failed, moves on to the other major dilemma facing a computer-driven society: how to make music theory interesting and entertaining. Harmony Grid provides a partial answer.

You can think of scales and chords in several ways. Keyboard players view specific keys as representing specific notes, woodwind and brass players associate combinations of pads and valves with certain notes, and string players tend to see notes as patterns and positions on the instrument. This latter way of thinking forms the basis of Harmony Grid.



Harmony Grid takes an experimental approach to harmony theory. The circles on the grid indicate active tones. To the left are possible scales and, above, the counterpoint options. Here, Harmony Grid's 2 x 1 grid shows its "minor" scale with A as the root. Traditionally, the key of A minor has no sharps or flats.

Each grid is arranged so that scales can be viewed as repeating patterns. On a 2 x 1 grid (meaning that horizontal movements are whole steps and vertical movements are half steps), an ascending major scale in any key is always three dots right, one dot up, three right, and one up. The advantage is that you can easily see the whole- and half-step relationships in a scale, without having to deal with the vagaries of the piano keyboard (although a graphic keyboard is included at the bottom of the screen). When you choose a scale pattern, the program filters out nondiatonic tones so that only the notes in that particular scale are played. Using the grid, you can choose a wealth of different scales, including major, various minors, whole-tone, pentatonic, and jazz-altered. You can even define your own scales, if Locrian mode is more your style.

Harmony Grid also makes improvisation more fun by including several counterpoint options. As you move the

got it made in the shades.



*Suggested U.S. list price. © 1990 Hewlett-Packard Company PE12004

Gb4	B 4	E 5	A 5	D 6	G 6	C 7
B 3	E 4	A 4	D 5	G 5	C 6	F 6
E 3	A 3	D 4	G 4	C 5	F 5	Bb5
A 2	D 3	G 3	C 4	F 4	Bb4	Eb5
D 2	G 2	C 3	F 3	Bb3	Eb4	Ab4
G 1	C 2	F 2	Bb2	Eb3	Ab3	Db4
C 1	F 1	Bb1	Eb2	Ab2	Db3	Gb3

Harmony Grid lets you view common musical concepts graphically, such as the circle of 5ths shown here.

mouse, the program harmonizes your tune, again filtering out unwanted scale tones. You can change counterpoint modes along with the different scales during play by holding down combinations of the Shift and Caps Lock keys and pressing one of the Mac number keys.

Where Harmony Grid fails is in its apparent disdain for the conventions of music theory. Minor mode, as defined by the folks at Hip Software, is not the traditional Aeolian mode, as recognized by every musician since the birth of the Renaissance, but rather the alternative Melodic Minor. Where musical terms seem too archaic or trivial, the manual simply provides its own. It may be hip, but it's also wrong. People attempting to further their musical education on the basis of the Harmony Grid manual will find themselves at a disadvantage.

THE BOTTOM LINE In the best of all worlds, you would use these two programs in conjunction with one another. For those who are just beginning their explorations in music, Harmony Grid provides a way to visualize the rudiments of scales and chords (albeit in a hazy way) while offering the pleasure of creating music in a safe and controlled environment. Having tested the limits of the Grid and desiring a taste of traditional music theory, you should find that Practica Musica is all you could want in a first-year harmony program. The ideal harmony teacher would be an integrated combination of both programs — until that comes, your best plan is to buy both.

— Christopher Breen

Get Info

Practica Musica

★★★★★

Published by: Ars Nova Software, P.O. Box 637, Kirkland, WA 98083; (800) 445-4866.
Version: 2.2.
List Price: $125.

Harmony Grid

★★★★½

Published by: Hip Software, 117 Harvard St., #3, Cambridge, MA 02139; (617) 661-2447.
Version: 1.05.
List Price: $99.



With the PaintJet color printer from Hewlett-Packard.

Look at the possibilities. Instead of basic black and a few dull shades of gray, look at the zip that color adds to graphs and charts. Overheads will command attention. And reports will have sparkling visual surprises tucked inside.

The PaintJet printer brings so



Rumor Manager

Gossip, Guesses, and Goings-On

The word from Einen, West Germany, is that Apple is working very hard on a speech-or voice-input device. To avoid further conflicts with Apple Corp., the Beatles' music company, this device will be limited to handling short commands (lasting ten seconds at most), which will be recorded and read into the Macintosh at a maximum quality of 5.5 kilohertz (or fairly low voice resolution).

Furthermore, as System 7.0 gets pushed back further and further, there is a good chance that this device, and its accompanying technology, will make it into one of the several System 7.0 incremental releases — probably not 7.0 but maybe 7.33 or 7.77. If all the gremlins can't be exorcised in time for 7.77, voice commands in the System software will appear in System 8.0 for sure (but that may be late 1991 or even 1992).

Current plans call for this technology to replace the keyboard as the text-entry device of choice, making the voice-recognition box and mouse (the two can be combined in one unit) standard. Once that happens, a Shut Up command will be added to the bottom of the Special menu in the Finder.

Some poking around in Cupertino also produced news about this voice commander. It has several problems. At the moment, the prototype is a serial device, and Macs are still perpetually short of serial ports (and that's not about to change anytime soon). The voice commander must be made to work on the Apple Desktop Bus (ADB), which is no trivial task.

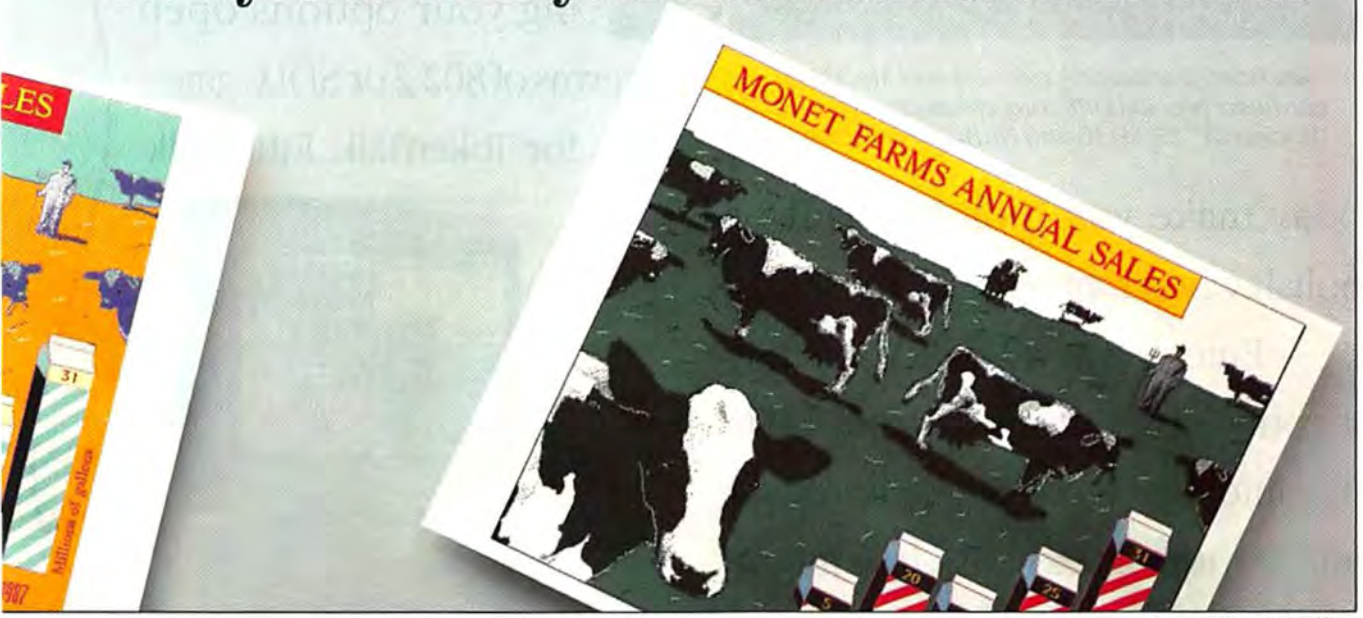
Another major problem is finding a microphone of suitable sensitivity and directionality so that my telling *my* Mac to erase a disk doesn't wipe out *your* hard disk. Putting the microphone into the mouse actually helps.

Further digging about in Cupertino also turned up some news on the second Mac portable. The introduction will be very soon. The Mac Portable 2 will be about the same size as its cousin but will weigh in at a few pounds less. The newly redesigned keyboard will feature a row of function keys. The speed will most likely remain the same (16 megahertz), and the screen will remain the same. No backlighting yet. Finally, it will have an all-new case along the lines of the excellent Madson Portable case. Oh, yes, and the video-interface box will be available at launch.

■ ■ ■ ■

Our U.S. Mail address is Rumor Manager, c/o *MacUser*, 950 Tower Lane, 18th Floor, Foster City, CA 94404. Our electronic addresses are MacUser (on MCI Mail) and 72511,45 (on CompuServe). No calls, please.

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CHASING THE IIfx: ACCELERATORS

Faster than a speeding bullet! More powerful than a locomotive! We tested 30 ways to turn your mild-mannered Mac into a super performer.

BY WINN L. ROSCH AND THE MACUSER LABS STAFF

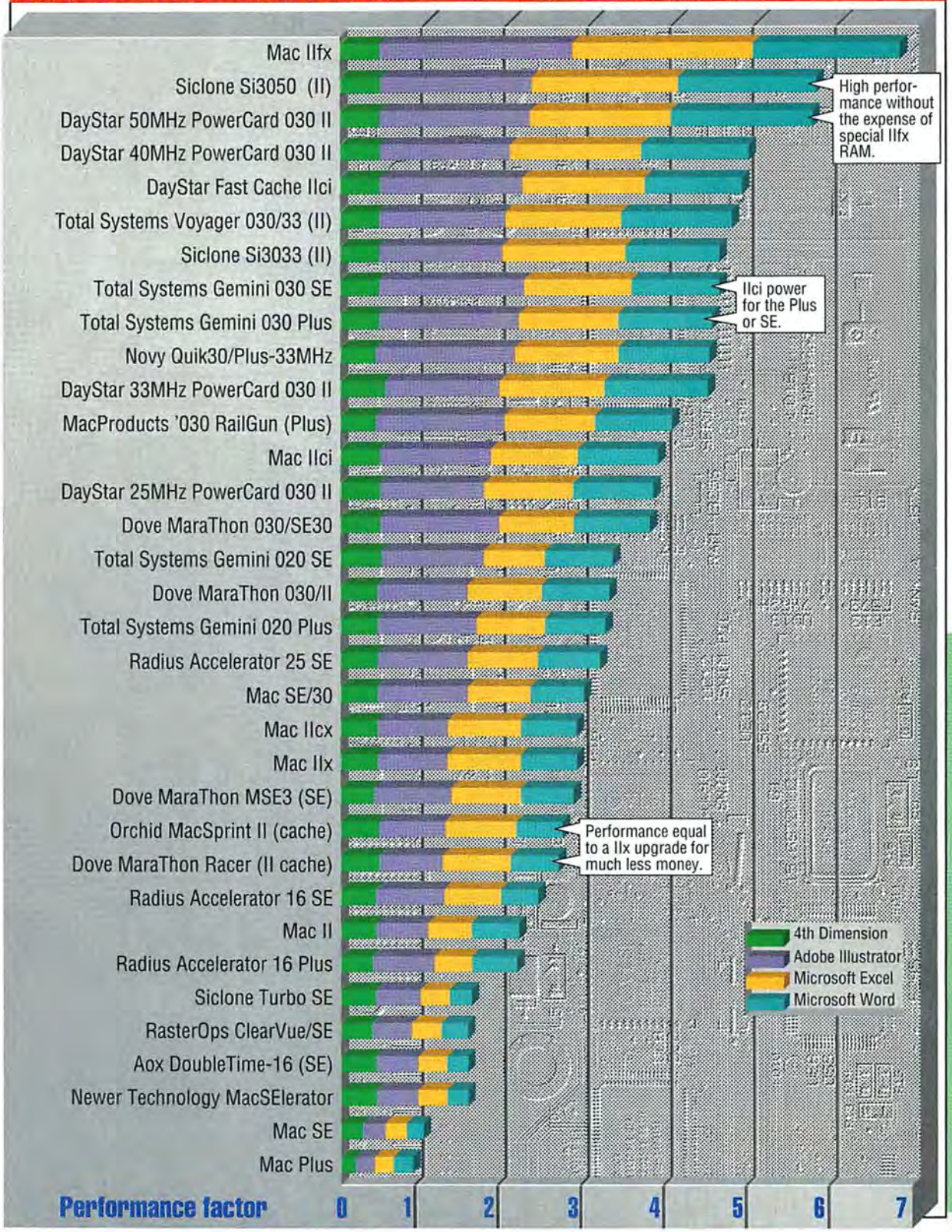
Thou shalt not covet thy neighbor's computer — unless it's a Mac IIfx. Apple's new hyperfast flagship has redefined the peak of Mac performance. The instant the IIfx was announced, an epidemic of CPU envy infected thousands of formerly healthy Macintosh users. Speed greed is on the upswing, and no one is immune.

Fortunately, antidotes are available. A dozen manufacturers offer ways to improve your Mac's performance, whether you have a lowly Plus or the recently dethroned IIci. You can accelerate your Mac II so it will work almost as quickly as the enviable IIfx, and with a logic-board upgrade from Apple, you can even transform it into a full-fledged IIfx. Any Mac can find a new, faster life with an accelerator board or a logic-board upgrade to move it up the evolutionary ladder.

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Figure 1: Real-World Performance



Accelerator boards and upgrades are add-ins that can speed the pace of most Macs' already quick microprocessors. No matter what Mac model you have, there's something available to make it faster — you can improve even the speedy IIfx with a QuickDraw accelerator (see the "QuickDraw Accelerators" sidebar in "In Living Color," May '90, Buyer's Guide, page 40). Accelerators can make your calculations quicker, screen changes speedier, and cut-and-paste jobs smoother.

Although the results of acceleration are easy to see, the technology is complex — in some cases involving an entire brain transplant for your Mac. Moreover, every Mac system is different, and so is every enhancement, and the results each combination delivers vary with the programs you run. Depending on what you have, what you do, and what you spend, your work can go anywhere from 20 to 600 percent faster with an accelerator or upgrade.

Putting together the right combination of accelerator and Mac can be a tough job, if only because of the large number of products available — we turned up a total of 30 accelerators and upgrades aimed at various Mac models. We put each through a battery of tests to help you find the best one for you. This report shows you what your acceleration options are, which ones best suit what you do with your Mac, and which products are the most cost-effective speed solutions for your system. Make the right choice, and your new accelerator board can mean not just creating a little extra free time but also perhaps changing the chore of working with your Mac into a veritable vacation.

Figure 1: An accelerator is worth the investment only if it speeds your day-to-day work. We tested each accelerator — as well as each Mac from the Plus to the IIfx — with four common applications (Apple's logic-board upgrades perform identically to the appropriate Mac). The chart shows how many times as fast each accelerator or Mac performed when compared with an unaccelerated SE.

We sorted a large 4th Dimension database and found that an accelerator had little effect on this common database procedure. A faster hard-disk drive would be a better investment.

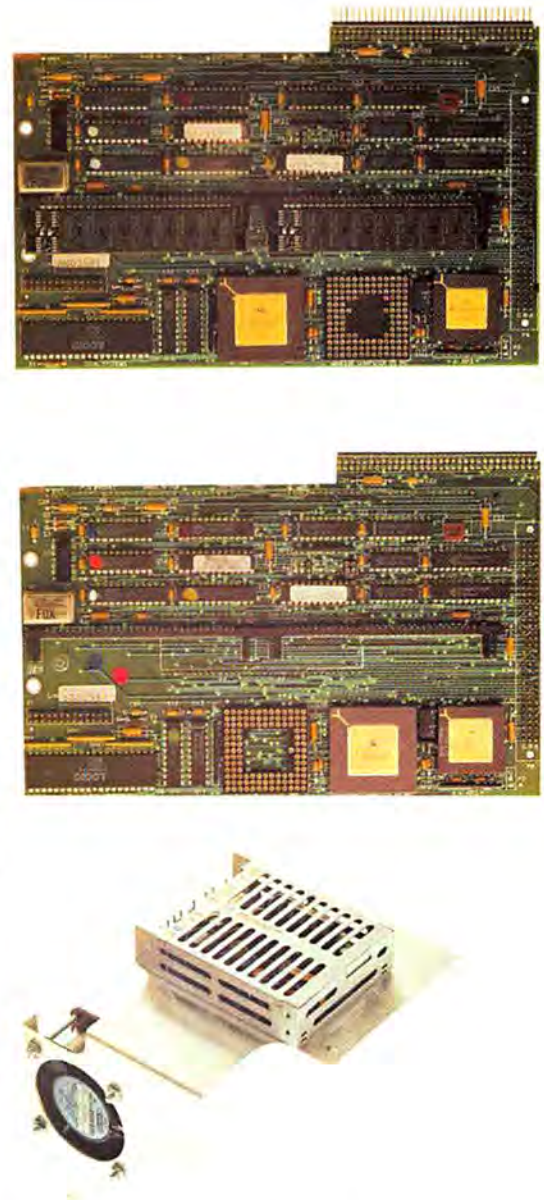
We then previewed a large and complex Adobe Illustrator document, recalculated a mortgage in Microsoft Excel, and performed a global search and replace in Microsoft Word. All three applications benefited from acceleration, with the Illustrator preview the most dramatically improved. However, even the fastest — and most expensive — accelerators were beaten by a Mac IIfx right out of the box.

Performance Options

Although a single concept, better Mac performance involves a variety of technologies and products. Endowing your Mac with an entirely new and faster microprocessor is only one of the options available. You can also add more memory to augment your system's performance or slip in a memory enhancement called a cache board. More-specialized products such as QuickDraw accelerators and FPUs (floating-point units) supercharge a single facet of your Mac's operation. Moreover, most of these acceleration products are not mutually exclusive. You can add one or several to your system, depending on what you want to achieve — and what you can afford.

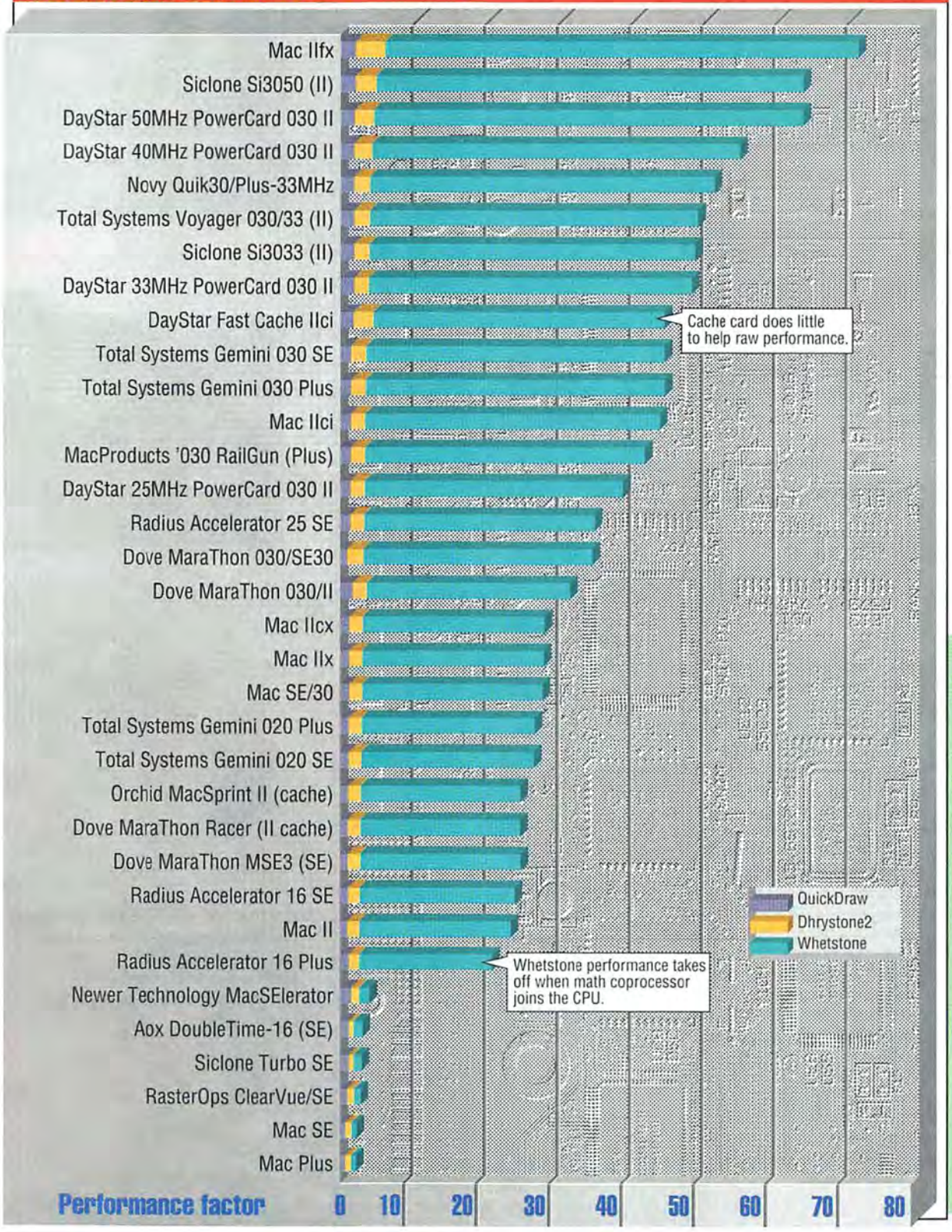
Deciding which to choose requires consideration of what Mac model you have and what you do with it. Some acceleration strategies are effective only for particular application types and are a waste of money if they are not targeted at the kind of work you do. Also, not all types of acceleration products are available for — or needed with — all Mac models.

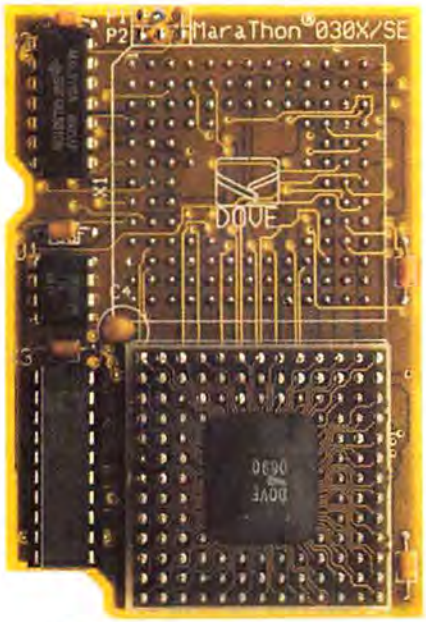
The obvious enhancement is to replace your Mac's microprocessor chip with a faster, more powerful one (see the "Chip's Family History" sidebar). Unfortunately, replacing just this chip is more complex than most chores you normally face around your



Your Plus can outperform a IIcx by using a Total Systems Gemini 020 Plus (top) or beat a IIci by using a Total Systems Gemini 030 Plus (center). For best SCSI performance, don't pass up the optional GemKit (bottom).

Figure 2: Raw Performance





Your SE/30's performance can improve by 40 percent if you install a Dove MaraThon 030/SE30.

home or office. Not only would you have to deal with the vagaries of a soldering iron, but you would also need to adapt the faster chip to mate with your Mac's slower circuitry. This adaptation involves adding a few extra chips and circuits — which is how manufacturers create accelerator boards.

The most significant advantage of an accelerator that is based on a faster microprocessor is that it speeds up everything. No matter what sort of software you run regularly, you'll see some improvement if you replace your system's microprocessor with a faster, more powerful model (see Figure 1). Not every program speeds up equally, though, and some may not speed up enough to make your investment in an accelerator cost-effective. Other acceleration strategies may yield higher returns.

Figure 2: Raw-performance tests show how quickly an accelerator — or Mac — can perform pure computational tasks that aren't dependent on applications or disk speed. Using the same comparison method we used in Figure 1, we found a tremendous increase in raw performance as we climbed the evolutionary ladder.

MacUser Labs' QuickDraw benchmark draws text, lines, rectangles, and frame arcs and performs scrolling and bit-map-copying operations. The Mac IIfx performed this graphics smorgasbord more than five times as fast as an unaccelerated SE.

Dhrystones and Whetstones are industry-standard tests of a CPU's peak performance. Dhrystones2, the latest version, tests integer and string operations that mimic real-world computation. The Whetstone test performs floating-point calculations beyond the simple math used in most spreadsheet setups and benefits immensely from a math coprocessor. Even the slowest FPU user, the Radius Accelerator 16 Plus, was 60 times as fast as an FPU-less SE; the Mac IIfx was a full 200 times as fast.

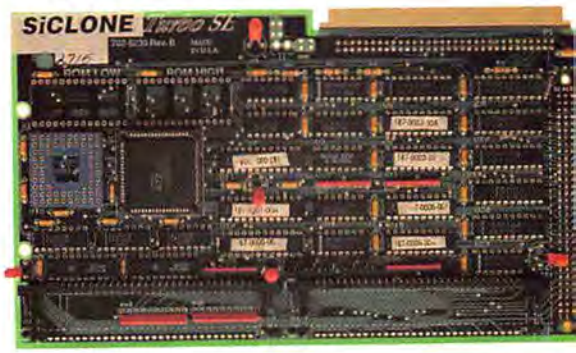
Outgunning QuickDraw

To your applications, your Mac's circuitry is like a bramble patch. As instructions and data work their way through the tangle of chips, something always gets in the way to slow things down. Cut through the microprocessor slowdown, and something else will snag your sweater. The culprit, and thus the most effective speedup for your system, depends on the type of application that you're running.

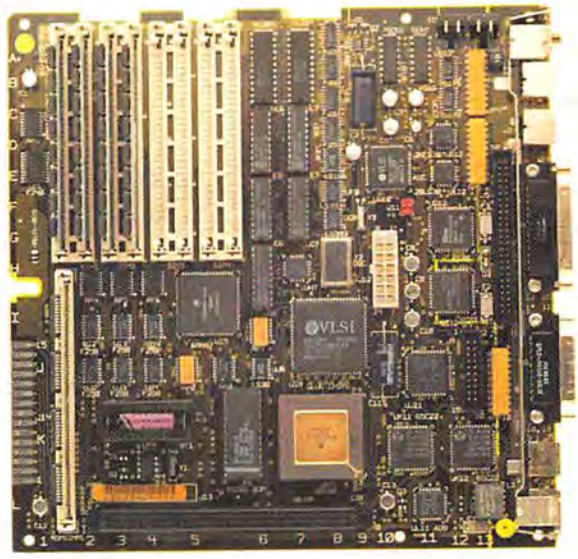
If you work with color images and 32-bit QuickDraw, for example, a QuickDraw accelerator can dramatically improve your Macintosh's performance. Images that normally take eight seconds to paint on-screen can flash up in two seconds or less with an accelerator.

A QuickDraw accelerator can be a separate NuBus board, a daughtercard that attaches to a NuBus video board, or part of the video board itself. The accelerator incorporates its own high-speed microprocessor dedicated to handling your programs' QuickDraw needs. It earns its big speedup by functioning as a true coprocessor, relieving your Mac's main microprocessor from the video overhead. In addition, the QuickDraw accelerator is designed and optimized for a single purpose — speeding up QuickDraw — so it's naturally faster than your Mac's general-purpose microprocessor.

QuickDraw accelerators give the most noticeable improvement when you run programs that make heavy use of 24-bit color — programs such as Adobe Photoshop, Electronic Arts'







The Siclone Turbo SE (top) is a great buy for SE owners. The ClearVue/SE (center) includes a two-page monochrome monitor for $1,999. For all-round performance and features, Apple's Mac SE/30 logic-board upgrade (bottom) is your best bet.

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		JUL	AUG	SEP	OCT	NOV	DEC
Revenue *(In Thousands)*	Actual	$8,400	$12,300	$13,900	$8,700	$13,000	$21,300
	Forecast	$6,453	$8,800	$10,050	$9,460	$12,000	$18,900
	Variance	$1,947	$3,500	$3,850	($760)	$1,000	$2,400
	%	130%	140%	138%	92%	108%	113%
Cost of Goods Sold	Actual	$1,848	$3,198	$3,475	$2,262	$2,860	$7,663
	Forecast	$1,549	$2,288	$2,312	$1,608	$2,640	$3,969
	Variance	$299	$910	$1,164	$654	$220	($3,969)
	%	119%	140%	150%	141%	108%	0%
	Gross Profit	**$6,552**	**$9,102**	**$10,425**	**$6,438**	**$10,140**	**$21,300**

WxC 1000

		JUL	AUG	SEP	OCT	NOV	DEC
Revenue *(In Thousands)*	Actual	$2,184	$3,198	$3,892	$2,610	$4,030	$5,325
	Forecast	$1,613	$2,200	$2,513	$2,365	$3,000	$4,725
	Variance	$571	$998	$1,380	$245	$1,030	$600
	%	135%	145%	155%	110%	134%	118%

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MEMO:

TO: *Shannon Pitts*

FR: *Peter Cohen*

DT: *November 13th, 1989*

RE: *Presentation to the Board*

In preparation for the annual meeting, I've created a 20-minute slide presentation on our successful entry into the small printer market.

The presentation will explain to the shareholders that, on a basis of sound marketing strategy, reinforced with our knowledge of the printer business at other levels, we have been able to grow from a 2 percent share of market, to 9 percent in 18 short months.

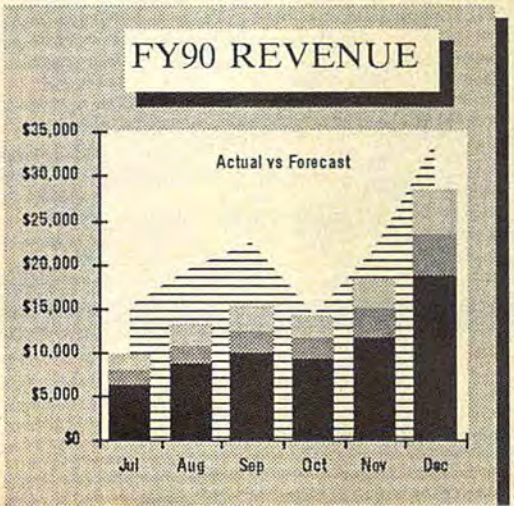
To the right is an excerpt of the presentation which illustrates our growth. Anticipated concerns will probably center around quality of service and the ability to meet market demand over the next year.

We should be able to squelch any fears by explaining that our small printers have a very low (4%) field repair call requirement at present.

And our assembly resources here in the

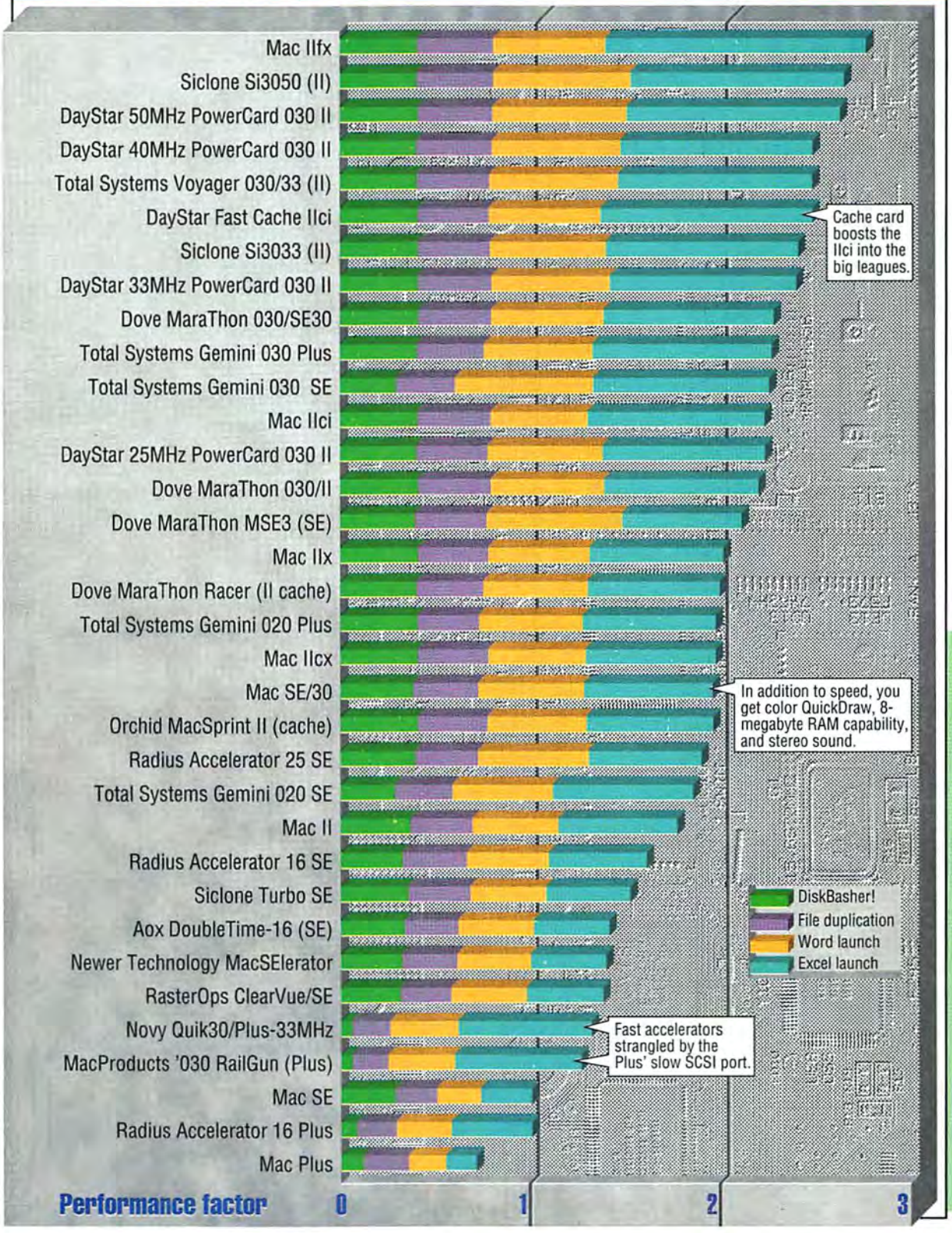
WxC 2000	JUL	AUG	SEP
Revenue *(In Thousands)*			
Actual	$8,400	$12,300	$13,900
Forecast	$6,453	$8,800	$10,050
Variance	$1,947	$3,500	$3,850
%	130%	140%	138%

With a very respectable 9 percent share after only 18 months, we feel we can reach 15 percent by the end of the next fiscal year (see six month projection).



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Figure 3: Disk-Intensive Performance



Studio/32, Letraset's Color Studio, and SuperMac Technology's PixelPaint Professional — although 8-bit-color applications also benefit from accelerators that can accelerate 8-bit color. Don't worry about accelerating your monochrome display, though, since an unadorned Mac can easily handle its simple pixel work.

Programs that work with PostScript are good candidates for a microprocessor accelerator because PostScript relies quite heavily on the number-crunching part of your Mac. PostScript graphics applications that benefit most from microprocessor acceleration include desktop-publishing and illustration programs such as Aldus PageMaker, Adobe Illustrator, and Aldus FreeHand. Three-dimensional-drawing and -rendering programs — Paracomp's Swivel 3D, Pixar's Renderman, and Strata's StrataVision 3d, for example — also benefit from a CPU accelerator.

Some programs combine 32-bit QuickDraw with PostScript images. In PageMaker, for example, you might flow text around a 24-bit-color photo. Such applications can benefit from QuickDraw and CPU acceleration individually or, even better, from both. Besides PageMaker, Letraset's Design Studio and Quark's QuarkXPress are likely to need to tap the powers of both of these acceleration techniques.

Figure 3: No matter how fast your accelerator or CPU, it runs into the SCSI bottleneck each time it accesses your hard disk. Using the same comparison method we used in Figures 1 and 2, we found that the total increase in disk-intensive performance between an unaccelerated SE and a IIfx was less than a factor of 3.

MacUser Labs' DiskBasher! test of hard-disk performance showed the level of SCSI-port evolution to be the determining factor in performance. We then duplicated a large folder in the Finder and found that some accelerators can actually hurt Mac Plus performance, because of the Plus' lack of hardware handshaking for its SCSI port. (Total Systems solves this problem by offering an optional — and highly recommended — SCSI upgrade.)

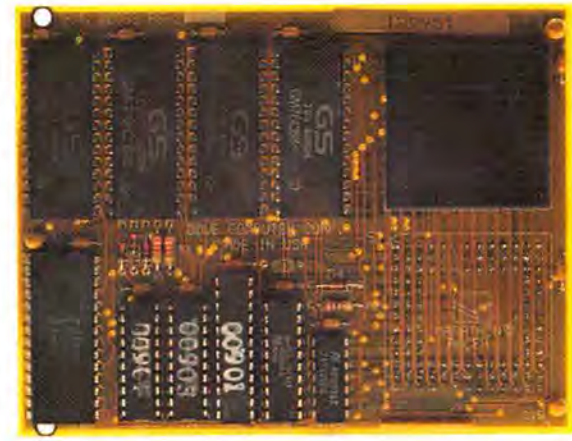
We also opened large Microsoft Word and Excel documents from the Finder to evaluate performance improvements in application loading and setup times. Because the CPU gets involved in setting up each application, we found significant improvement compared with simpler disk-intensive tasks.

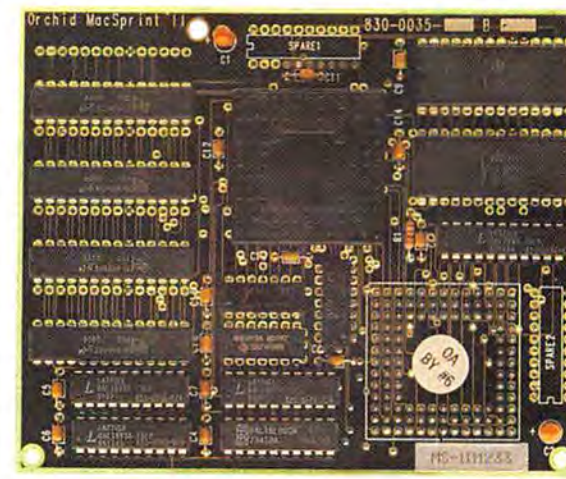
Further Improvements

A floating-point unit can also dramatically improve the performance of your Mac Plus or SE. If you own a Mac II or later, you already have an FPU (although you may want to upgrade to a faster version). Sometimes called a math or numeric coprocessor, a Motorola 68881 or 68882 FPU is optimized to handle floating-point operations (see Figure 2) in applications that draw on its abilities (see the "Inside SANE" sidebar). That is, it can calculate numbers with decimal fractions (it's the decimal point that floats through its calculations) with lightning speed — an FPU can speed up the jobs for which it was designed by as much as 400 times!

Don't be misled into believing that any program that uses math will accelerate if you add an FPU, though. The FPU is at its best crunching through math functions such as square roots and trigonometric operations (sines, cosines, tangents, and the like). It usually doesn't speed up ordinary addition and subtraction, since these operations take place in the CPU. Moreover, most applications, even those that occasionally come up with decimal or fractional answers, use integer math.

The applications that can benefit are those that grind through tons of numerical grist — statistical analysis, scientific modeling programs, and applications that manipulate complex graphics and 3-D models. Examples of these include Spyglass' Scientific Modeling, Odesta's Data Desk, and SAS Institute's JMP as well as most CAD packages (see "Mac CAD Takes Off" in this issue). Also, if your spreadsheet work involves elaborate financial modeling,



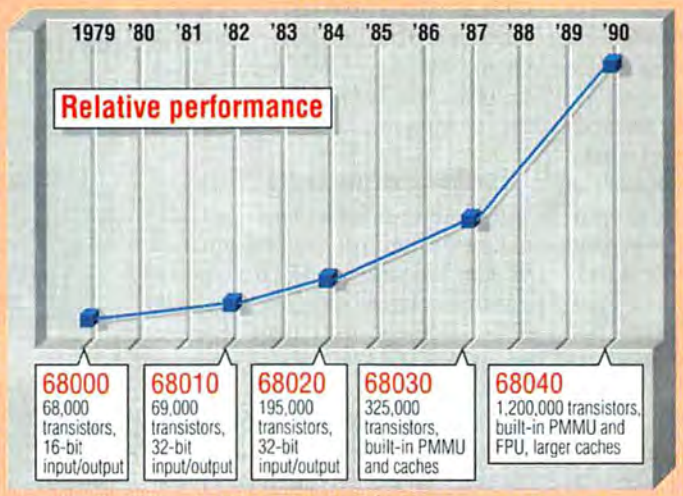




The Dove MaraThon Racer (top) and Orchid MacSprint II (center) cache cards are quick and easy ways to speed up your Mac II. The DayStar 25MHz PowerCard 030 II (bottom) is a cost-effective full-fledged accelerator.

Chip's Family History

In 1979, Motorola unveiled a new chip containing 68,000 transistors on a wafer no bigger than a few square millimeters. Dubbed the MC68000, the new chip began a line of microprocessors that were to become the major CPUs in the workstation market and — lucky for us — the brains of the Mac. In fact, the 68000 family has been so successful that posters warning "680X0: Just Say No" have appeared in the offices of Intel, manufacturer of the microprocessors used in IBM PCs and their clones.



The Motorola family of 68000 microprocessors has grown quickly in speed, features, and number of integrated transistors. Motorola's relative-performance rating includes clock speed, input/output data-path size, presence of on-board memory-management and floating-point units, and number of instructions executable per second.

Although it was a modest performer at first, the 68000 family has improved over the years, with each descendant able to run software developed for earlier versions. Over the past 11 years, Motorola has added transistors, shortened the distances that signals travel, introduced more functions, and added parallel processing. The result has been an almost exponential growth in performance.

Although the original 68000 used a 32-bit data path internally, it communicated with the outside world only in 16-bit chunks. And Apple didn't make use of the full 16-bit path until it developed the Mac SE; previous Macs employed 8-bit throughput. The first addition to the 68000 line was the little-known 68010. Although it added 32-bit input/output, it included little other improvement. Apple passed it over and opted instead for the next Motorola upgrade, the 68020, when it introduced the Mac II.

The 68020 almost tripled the number of transistors that the 68000 squeezed onto a chip and was three to four times faster than the 68000. Apple improved the speed of the Mac II by also including a Motorola 68881 floating-point coprocessor, which freed the CPU from math-intensive tasks. As an option, Mac II owners could also add a 68851 PMMU (Paged Memory Management Unit) chip, which allowed software such as A/UX or Connectix's Virtual to use virtual memory. The 68020 and 68851 were nice chips, but their use was short-lived in the Mac.

While Apple was busy rolling out the hot new Mac II in 1987, Motorola announced the next upgrade to the CPU line, the 68030. The 68030 included a memory-management unit built into the chip itself. Motorola also beefed up the chip's performance by using a concept known as *Harvard architecture*, borrowed from the mainframe world, which allowed certain operations to be processed simultaneously. Performance was also greatly helped with built-in caches for data and instructions. With its 325,000 transistors, the 68030 is now the workhorse of the Mac line and is the brains of the SE/30, IIcx, IIci, IIfx, and now-discontinued IIx.

The latest in Motorola's line is the 68040, unveiled last winter and expected in a Mac sometime next year. And what a Mac that will be — in addition to everything the 68030 has, the 68040 incorporates a built-in floating-point unit, making a math coprocessor unnecessary. Because signals don't have to leave the chip, floating-point performance is an order of magnitude faster than that of the 68030. The caches are larger than those found in the 68030, and there is a much greater degree of *concurrency* (more operations are processed in parallel).

The result is a CPU with 1,200,000 transistors (more than 17 times the number in the original 68000) and with more than 27 times the raw performance of the 68000. In fact, Motorola claims that the 68040's performance is as fast or faster than that of RISC workstation processors such as the Sun SPARC or Motorola's own 88000. Power users, start saving your pennies — lots and lots of pennies.

— John Rizzo

an FPU can be a godsend.

Disk-intensive applications — such as database management — often don't benefit much from microprocessor-oriented acceleration (see Figure 3). If you're a database developer, however, an accelerator can help you zip through time-consuming syntax checks and layout building. There's one sure way to speed up all work with your favorite database program: a faster hard-disk drive. ACIUS' 4th Dimension, Blythe Software's Omnis 5, Fox Software's FoxBASE+/Mac, and HyperCard can all benefit when you upgrade to a superfast hard-disk drive.

Disk speedup is easy — just install a new, faster disk. As a side benefit, you'll also get more storage space, because fast disks are typically larger than slower models. The bigger the disk, the more read-write heads it has and the faster it can access data. But the real reason for the big = fast equation is simple economics: Manufacturers use their fastest hardware on their biggest, most expensive drives.

The Mac Plus suffers from a singular problem with hard-disk performance — its SCSI controller lacks a *handshaking* connection, which means the Mac Plus microprocessor can never be certain whether its hard disk is ready to receive data. To avoid

Inside SANE

Even Mac programmers, mathematicians, and rocket scientists (as well as average businessfolk) are happy to leave the serious number crunching to the computer. Instead of forcing programmers to write new, elaborate code for every math-intensive application, Apple has simplified their task by creating SANE (standard Apple numeric environment). This hidden industrial-strength arithmetic is the part of the Mac operating system that controls the 68881 and 68882 math coprocessors. Application developers make simple calls to SANE, which then handles the time-consuming details of floating-point math.

SANE is based on the IEEE (Institute of Electrical and Electronics Engineers) 754 standard. Apple chose to go beyond the requirements of this standard, however, and gave SANE increased precision (for a complete nuts-and-bolts programmers' reference, see the *Apple Numerics Manual*, second edition (Reading, Massachusetts: Addison-Wesley, 1988). Unfortunately, because it performs calculations to more decimal places, SANE is slower than the IEEE standard.

Several of the Mac accelerator boards we tested come with optional software replacements for SANE. These coprocessor drivers don't calculate to as many decimal places as SANE does and therefore can significantly speed up floating-point calculations. For example, Radius' SANE alternative, Radius Math, follows the IEEE standard more closely than does SANE — achieving faster performance.

These SANE replacements usually take the form of an INIT (automatically loaded into memory at startup) or a cdev (accessible via the Control Panel) that offers you the choice of standard SANE or its alternative. When the alternative is active, applications are fooled into thinking they are making calls to SANE, so compatibility is usually good.

As far as the accuracy of your work goes, SANE alternatives shouldn't make a difference in everyday spreadsheet or graphics programs, in which calculations are fairly simple. However, if you're doing extensive calculations (perhaps in scientific research or statistical analysis, in which accuracy to many decimal places is paramount), stick with SANE.

— John Rizzo

losing vital information, the whole system waits long enough to be sure everything has gotten to the disk, wasting vital microseconds that could be used for processing. The only way around this problem is to improve your Mac Plus' SCSI system. The Total Systems GemKit for its Gemini series of accelerators does just that.

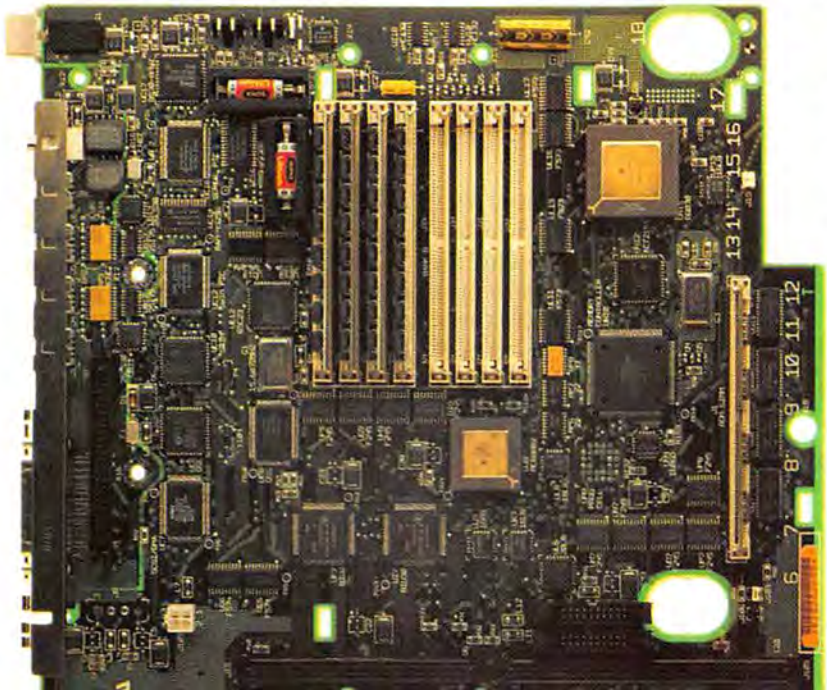
Memory Matters

If your system has a lot of memory — that is, memory to spare — you can put it to work accelerating the performance of your system's disk as a RAM cache. A RAM cache stores disk data in memory, where it can be accessed electronically many times faster than through the mechanical facilities of the disk. The more memory in the cache, the more the disk can speed up.

You control the amount of memory that your Mac devotes to its RAM cache via the Control Panel. You can devote up to 4 megabytes to your RAM cache — providing, of course, that you've got at least that much memory in your system. That's one more reason for putting as much RAM into your Mac as you can.

Adding memory to your Mac also helps boost the speed of applications, such as Ashton-Tate's Full Impact and Adobe Photoshop, that take advantage of *virtual-memory* techniques. These programs are smart enough to break themselves into pieces and temporarily store chunks on your hard disk that won't fit into RAM. Of course, shuffling program parts from disk to RAM and back again slows down your Mac about as much as chaining an iron ball to your mouse. Add more RAM, and the programs zoom back up to RAM speed.

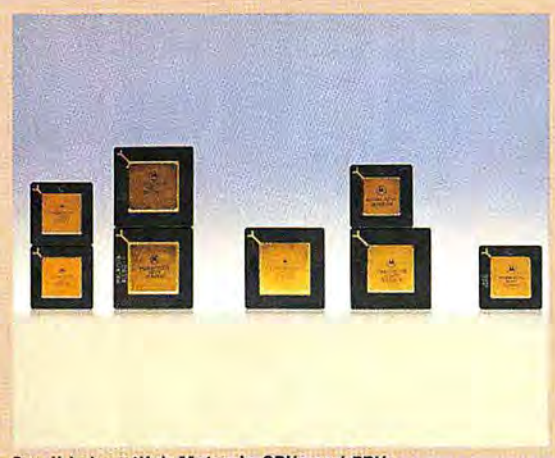
One problem all high-performance computers have to face is keeping up with the dizzying data-processing rates of their microprocessors. You can choose to enhance your system's memory by adding a *memory cache*, a block of blazingly fast RAM chips — usually expensive static-RAM chips rated at 25 nanoseconds (billionths of a second). (System RAM is relatively pokey, rated at 80 to 120 nanoseconds.) Caches temporarily store data or instructions that would otherwise have to be accessed from slower RAM. As with disk caches, the larger a memory cache is (all else



The Mac IIfx logic-board upgrade is the clear performance winner for Mac II and IIx owners and the fastest CPU in all our tests.

On the Horizon

The Mac IIfx is not the only new high-speed star in the Mac firmament. Apple has also announced its Macintosh IIci Cache Card, which features 32K of high-speed static RAM. Requiring no software, this card simply drops into the IIci's cache-card slot and configures itself when the IIci is powered up. Other vendors are entering the cache-card field as well: UR-Micro (Williamsville, New York) is now shipping MacCache, a 64K static-RAM-cache board with accompanying cdev, and Micron Technology (Boise, Idaho) is offering the Xceed IIci-128 cache card with 128K of static RAM.



Small is beautiful: Motorola CPUs and FPUs

Total Systems now offers the Voyager 030/50, manufactured by Siclone and similar to the Si3050 tested in this lab report. With a 50-megahertz CPU and 64K static-RAM cache, the Voyager 030/50 lists for $4,995. Add a 50-megahertz FPU, and the price jumps to $5,995. Total Systems will also offer 33-, 40-, and 50-megahertz versions of the Gemini 030 (FPU optional).

Newbridge Microsystems will offer its NewLife 25 accelerator for the Mac 128K or 512K (with "enhanced" 128K ROMs), 512KE, Plus, and SE. Featuring a 25-megahertz 68030 and a 68882, the NewLife 25 will list for $1,530. The NewLife 33 for the SE and SE/30 will feature a 33-megahertz 68030/68882 chip set and a 64K static-RAM cache; its faster performance will set you back $2,995. The NewLife 25 and 33 will both feature an optional video interface for popular multisync and full-page monitors. Newbridge Microsystems, 20 Edgewater St., Kanata, Ontario K2L 1V8, Canada; (613) 836-1014.

At press time, two low-cost accelerators were under development for earlier Macs. Both promise System 7 compatibility, thanks to their use of 16-megahertz 68030 processors. Dove's MaraThon 030 for the Plus or SE will provide a 16-megahertz 68030 that clips onto the Plus' or SE's 68000 CPU. The MaraThon 030 will list for $695 and come bundled with Symantec's SUM II and SAM 2.0. Total Systems' Mercury 030 Accelerator Upgrade Card will feature a 16-megahertz 68030 and a modular design to allow future expansion. Sockets on the Mercury will allow the addition of a 68882 FPU and up to 4 megabytes of fast RAM. Plug-in modules will add high-speed SCSI or video capability. Compatible with the Mac 128K or 512K (with "enhanced" 128K ROMs), 512KE, Plus, and the Mac SE, the basic Mercury 030 will list for $695 for the SE and $845 for Macs 128K through Plus.

DayStar will have two products — the SCSI PowerCard and the RAM PowerCard — that can use the PowerPlane interface featured on the PowerCard accelerators for the Mac II, IIx, and IIcx. Although both PowerCards can install in NuBus slots, optimum performance will occur when they are connected to one of DayStar's PowerCard accelerators through the PowerPlane. The SCSI PowerCard will feature an NCR 5390 SCSI controller, a 16-megahertz 68000 processor, and 4 SIMM sockets that can accept up to 16 megabytes of 100-nanosecond RAM for buffering disk data. The SCSI PowerCard will list for $1,295 without any RAM, $1,495 with 1 megabyte, and $1,995 with 4 megabytes. The RAM PowerCard will contain 16 SIMM sockets that accept 256K, 1-megabyte, or 4-megabyte 100-nanosecond SIMMs to provide 1 megabyte to 64 megabytes of memory. This RAM may be configured as system RAM and/or as a RAM disk. The RAM PowerCard will list for $695 without any RAM, for $1,995 with 8 megabytes, and for $3,495 with 16 megabytes.

MicroNet Technology (Irvine, California) will soon offer its NuPORT SCSI DMA Card, featuring an NCR 5390 SCSI controller. The NuPORT will initially ship as a $600 option for MicroNet's faster hard-disk drives. The NuPORT is a high-throughput SCSI interface specifically designed for hard-disk drives that can maintain sustained high rates of data transfer.

Novy Systems will offer a SCSI interface for $79 that adds high-speed SCSI capability to Quik30-accelerated Macs, from the 128K through the Plus. Novy will also manufacture this interface for use in the RailGun line from MacProducts.

For the Mac SE and II series, Mobius Technologies (Emeryville, California) will offer an aggressively priced integrated video/accelerator card in combination with a full-page monochrome monitor. Low-cost package deals such as these are being developed by several manufacturers.

— Jeffrey S. Pittelkau

being equal), the faster your system will usually perform.

The microprocessors used in more-advanced Macs have their own caches built right into the chip, but these caches are so tiny that they can't do the work of add-on memory caches. The 68020 has a 256-byte cache that can hold only microprocessor instructions. The 68030 has two 256-byte caches: one for instructions and one for data. Most add-on memory caches start at 4K and stretch to 32K or 64K. Adding a cache to systems that support them (or increasing the size of the existing cache) is generally the most cost-effective speedup you can buy. Some of the accelerators we tested have caches built in (see Table 1). We also tested three cache-only cards: the DayStar Fast Cache IIci; and the Dove MaraThon Racer and Orchid MacSprint II, both for the Mac II.

Some manufacturers use "smart" caching techniques (called *set-associative* caches) that allow smaller smart caches to operate faster than larger dumb caches. The only way to find out how well a cache works is to test it, which is one reason MacUser Labs put all 30 accelerators and logic-board upgrades through such an exhaustive set of tests.

Although more RAM is usually better, simply adding faster memory won't make a difference to your Mac's

Table 1: Features of Accelerators

	MacProducts '030 RailGun-25MHz ★★★½	Novy Systems Quik30/Plus-33MHz ★★★½	Radius Accelerator 16 Plus ★★★½	Total Systems Gemini 020 ★★★★
List price				
As tested	$999 with FPU	$1,994 with FPU	$1,095 with FPU	SE: $745 ($935 with FPU)
Options	$799 without FPU	$1,495 without FPU	$795 without FPU	Plus: $895 ($1,045 with FPU)
Comments	Manufactured by Novy and sold by MacProducts USA. Same basic design as Novy Quik30/Plus-33MHz. Limited SCSI throughput (upgrade planned).	IIci computing power in a Plus. Limited SCSI throughput (upgrade planned).	Complex installation, best left to dealer. Limited SCSI throughput, but SilverLining 5.2 software helps.	Complex installation, best left to dealer. Recommended GemKit option speeds SCSI throughput on Plus. Can be upgraded to 68030.
Macs supported	128K, 512K, Plus, SE	128K, 512K, Plus, SE	Plus	128K, 512K, Plus, SE
Hardware				
CPU and clock speed (megahertz)	68030, 25 MHz	68030, 33.3 MHz	68020, 16 MHz	68020, 16 MHz
FPU and clock speed (megahertz)	68882, 25 MHz	68882, 33.3 MHz	68881, 16 MHz	68881 (opt. 68882), 16 MHz
Static-RAM cache	no	no	32K direct map	no
Max. motherboard RAM	4 MB	4 MB	4 MB	512K
Max. accelerator RAM	4 MB	4 MB	NA	4 MB
Accelerator RAM wait states	0, 1, 2	0, 1, 2	NA	0, 1, 2
Mac ROM placement	copied to fast RAM	copied to fast RAM	NA	copied to fast RAM
Expansion ports	SCSI port for 128K and 512K Macs ($69), video	SCSI port for 128K and 512K Macs ($99), video	Radius MagicBus (for TPD and FPD interfaces)	for E-Machines monitor, fast SCSI
Power supply/fan	$99 option	$149 option	included	GemKit (fan, power supply, fast SCSI), $150
Software				
Accelerator disable	yes	yes	no	yes
Cache disable	yes	yes	no	yes
SANE patch	yes	yes	yes	yes
RAM disk	yes	yes	no	no
Other software	Smart Cache	LocalTalk and sound patches, hard-disk cache	sound patch	XPRAM INIT, Scroll Limit
Other				
Warranty	1 year	6 months	1 year	1 year
Manufacturer	MacProducts USA, Inc. 8303 Mopac Expressway Austin, TX 78759 (800) 622-3475 (512) 343-9441	Novy Systems, Inc. 1862 Fern Palm Drive Edgewater, FL 32141 (904) 427-2358	Radius, Inc. 1710 Fortune Drive San Jose, CA 95131 (800) 227-2795 (408) 434-1010	Total Systems 99 W. 10th Ave. Eugene, OR 97401 (800) 874-2288 (503) 345-7395

performance. But if you add slow memory to a Mac that requires the speedier stuff, your fast Mac won't work — period. All RAM chips are speed-rated, and by convention, this rating is given in nanoseconds. A 100-nanosecond RAM chip can operate at speeds up to about 10 megahertz. Putting faster chips into your Mac — 80-nanosecond instead of 120-nanosecond chips, for example — won't speed it up at all. The rated speed of memory chips indicates only how fast they can perform; your Mac determines how fast they actually do perform.

You need to worry about RAM-chip speed only when you want to move memory from one Mac to another or to an upgrade that you've made to your Mac, because you must ensure that the chips are capable of operating at the speed demanded by the system. For example, the 120-nanosecond chips used in Macs from the II to the IIcx don't work in the IIci, which requires 80-nanosecond chips. The hyperspeed IIfx complicates matters further, since it requires not only fast RAM but also an entirely different type of RAM-chip arrangement. This consideration is important if you're contemplating Apple's generous IIfx logic-board upgrade — you'll have to purchase all-new RAM.

The Screwdriver Game

Even if you're convinced that acceleration is the only thing that can make you truly happy with your Mac again, you face a troubling question: Can or should you install the accelerator yourself? The answer again depends on what Mac you have and what you want to install.

The most challenging project is upgrading a Mac Plus; things get easier as you move up the evolutionary ladder. With any non-NuBus Mac (the Plus, SE, and SE/30), you need special tools and must exercise special care. An "opening kit" usually includes a long-shafted T15 Torx screwdriver — Torx refers to the

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Table 1: Features of Accelerators, continued

	Total Systems Gemini 030 ★★★★½	Apple Mac SE/30 upgrade ★★★★½	Aox DoubleTime-16 ★★★★	Dove MaraThon MSE3 ★★★★
List price				
As tested	SE: $1,695 ($2,195 w/ FPU)	$2,298 with FDHD upgrade	$395 without FPU	$999 with FPU
Options	Plus: $1,895 ($2,395 w/ FPU)	$1,699 logic board only	$545 with FPU	$699 without FPU
Comments	Like Gemini 020 but has faster 68030/68882 chips and higher clock speed. Complex installation. GemKit option speeds SCSI throughput on Plus.	Color QuickDraw; stereo sound; capability for 8 MB of RAM wins out over other SE accelerator options, except in maximum speed. FDHD option recommended.	Low cost, modest increase in performance, simple installation. Good choice for tight budget.	Simple design with few components. Easy to install. Faster 68030 version should ship by the time you read this.
Macs supported	128K, 512K, Plus, SE	SE	SE	SE
Hardware				
CPU and clock speed (megahertz)	68030, 25 MHz	68030, 16 MHz	68000, 16 MHz	68020, 16 MHz
FPU and clock speed (megahertz)	68882 (opt. 68881), 25 MHz	68882, 16 MHz	opt. 68881, 16 MHz	68881, 16 MHz (opt. 68882)
Static-RAM cache	no	no	4K direct map	no
Max. motherboard RAM	512K	8 MB	4 MB	1 MB
Max. accelerator RAM	4 MB	NA	NA	4 MB (120 nsec or faster)
Accelerator RAM wait states	0, 1, 2	NA	NA	0
Mac ROM placement	copied to fast RAM	NA	NA	copied to fast RAM
Expansion ports	video-card adapters for MegaGraphics, E-Machines	030 Direct Slot	E-Machines video	E-Machines video
Power supply/fan	GemKit (fan, power supply, fast SCSI), $200	NA	NA	NA
Software				
Accelerator disable	yes	NA	yes	yes
Cache disable	yes	NA	no	yes
SANE patch	yes	NA	yes	yes
RAM disk	no	NA	no	no
Other software	XPRAM INIT, Scroll Limit	none	none	MacWrite 4.5 patch
Other				
Warranty	1 year	1 year	1 year	1 year
Manufacturer	Total Systems 99 W. 10th Ave. Eugene, OR 97401 (800) 874-2288 (503) 345-7395	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 (408) 996-1010	Aox, Inc. 486 Totten Pond Road Waltham, MA 02154 (800) 232-1269 (617) 890-4402	Dove Computer Corp. 1200 N. 23rd St. Wilmington, NC 28405 (800) 622-7627 (919) 763-7918

star-shaped pattern in the screw heads; the long shaft is needed to get at the two screws hiding down inside the handle of the Mac. Most opening kits also include a case cracker to help you pry open the cabinet of your Mac without breaking it and a static strap to aid in avoiding static damage to the delicate circuitry inside. Although Apple dealers are forbidden to sell these kits (priesthoods must protect their sacraments), a little snooping around supply shops or user groups should uncover what you need.

Besides static zaps and cabinet cracks, there are other ways to damage your Mac — that's where the special care comes in. For example, when you try to loosen the wires on your Mac's logic board, they're almost guaranteed to pop off suddenly — and make your hand fly into the neck of the picture tube. The result (snap, crackle, ka-boom) will likely damage you as much as your Mac. Little wonder that opening your Mac's case voids the Apple warranty. Then again, if you're thinking about an accelerator, you've had your Mac long enough to fall out of love with it — long enough that your warranty has probably expired.

Some sage advice: If you're upgrading a Mac Plus, buy — don't borrow — the tools needed to open it. Most Mac Plus accelerators simply clip onto the microprocessor inside and are about as secure as walking on a newly waxed floor in a ball-bearing factory with a banana peel stuck under your shoe. Unless you never move your Mac, the clip *will* pop off and your accelerator will screech to a halt. If you tote your Plus around, the clip will be likely to work its way off — probably when you need your system most. Don't just buy the opening kit — pack it in your sack when you travel.

If you're in doubt about your system-engineering skills, have your dealer do the dirty work of accelerator installation and cross your fingers when you travel with your Plus.

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Table 1: Features of Accelerators, continued

	Newer Technology MacSElerator ★★★★	Radius Accelerator 16 SE ★★★★½	Radius Accelerator 25 SE ★★★★½	RasterOps ClearVue/SE ★★★★
List price				
As tested	$505 with FPU	$1,095 with FPU	$1,895 with FPU	$1,995 with two-page display
Options	$295 without FPU	$795 without FPU	$1,395 without FPU	$795 with APD interface
Comments	Manufactured by Aox. Good price/performance.	Simple installation. Easy configuration via Control Panel or startup dialog box.	Like Radius' 16-MHz board, 25-MHz version also has 68882 FPU for faster performance. Easy configuration via Control Panel or startup dialog box.	Mac RAM and ROM must be moved to accelerator. Includes video interface for two-page monitor or Apple Portrait Display (see April '90, page 184).
Macs supported	SE	SE	SE	SE
Hardware				
CPU and clock speed (megahertz)	68000, 16 MHz	68020, 16 MHz	68020, 25 MHz	68000, 16 MHz
FPU and clock speed (megahertz)	68881, 16 MHz	68881, 16 MHz	68882, 25 MHz	opt. 68881, 16 MHz
Static-RAM cache	4K direct map	32K direct map	32K direct map	no
Max. motherboard RAM	4 MB	4 MB	4 MB	128K
Max. accelerator RAM	NA	NA	NA	4 MB
Accelerator RAM wait states	NA	NA	NA	1, 2
Mac ROM placement	NA	NA	NA	on accelerator
Expansion ports	E-Machines video	Radius MagicBus (for TPD and FPD interfaces)	Radius MagicBus (for TPD and FPD interfaces)	none
Power supply/fan	NA	NA	NA	NA
Software				
Accelerator disable	yes	yes	yes	no
Cache disable	no	yes	yes	NA
SANE patch	yes	yes	yes	incl. with FPU option
RAM disk	yes	no	no	no
Other software	none	sound patch	sound patch	video software, sound patch
Other				
Warranty	1 year	1 year	1 year	1 year
Manufacturer	Newer Technology 1117 S. Rock Road Wichita, KS 67207 (800) 678-3726 (316) 685-4904	Radius, Inc. 1710 Fortune Drive San Jose, CA 95131 (800) 227-2795 (408) 434-1010	Radius, Inc. 1710 Fortune Drive San Jose, CA 95131 (800) 227-2795 (408) 434-1010	RasterOps Corp. 2500 Walsh Ave. Santa Clara, CA 95051 (408) 562-4200

Adding an accelerator to a Macintosh SE, SE/30, or a member of the Macintosh II family is an easier — and safer — chore. Circuit surgery, however, even (or especially) in a Macintosh, is somewhat like skydiving — it really isn't hard to do, but a simple mistake can have troubling consequences. If you're worried about it, have a professional do the work for you.

If you choose an official Apple upgrade, you won't have a choice anyhow. In that case, your dealer is not only obligated to do the work but will also claim your old logic board and its ROMs as part of the price of the upgrade.

Mac Plus Power

Mac Plus accelerators spread across the entire microprocessor power spectrum. You can upgrade the standard-equipment 8-megahertz 68000 microprocessor to a double-speed 16-megahertz 68000; a 68020 running at 16 megahertz; or a 68030 at 16, 25, or even 33 megahertz. The best choices are the 68020-based accelerators that have sockets available for an add-on PMMU (Paged Memory Management Unit, a Motorola 68851 chip that costs about $195) or those based on the 68030 chip, which has a PMMU built in. The PMMU is required if you plan to use virtual memory, one promised feature of Apple's highly touted System 7.

Add-on accelerators for the Mac Plus are inherently problematic. Because the Plus lacks SCSI handshaking, most accelerators make its hard-disk performance worse. For example, MacProducts '030 RailGun-25MHz ($1,099) gave the most CPU speedup at the lowest cost, but our DiskBasher! test showed its SCSI Achilles' heel. The RailGun dragged down hard-disk performance to less than half the unaccelerated Mac Plus rate. Novy's $1,994 Quik30/Plus-33MHz suffers from the same problem, although an upgrade is in the works (see the "On the Horizon" sidebar).

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Table 1: Features of Accelerators, continued

	Siclone Turbo SE ⚡⚡⚡⚡	Dove MaraThon 030/SE30 ⚡⚡⚡½	Apple Mac IIx upgrade ⚡⚡⚡	Apple Mac IIfx upgrade ⚡⚡⚡⚡⚡
List price				
As tested	$398 without FPU	$699	$2,199	$3,998 with 4 MB of RAM
Options	$796 with FPU	NA	NA	$2,999 without RAM
Comments	A best buy. Low price, average acceleration. Mac RAM and ROM must be moved to accelerator.	Simple, small, low-cost. Features 68030 with twice SE/30 clock speed. Memory cache must be disabled when you format floppy disks.	Unlike IIfx, uses normal Mac II RAM. Pricey 68030 and 68882 upgrade offers small speed increase and PMMU capability; consider instead cache card, PMMU.	Apple's new 40-MHz CPU outperforms add-ons at reasonable cost. SRAM cache, fast DMA SCSI. Special IIfx RAM must be purchased (min. 4 MB).
Macs supported	SE	SE/30	II	II, IIx
Hardware				
CPU and clock speed (megahertz)	68000, 16 MHz	68030, 32 MHz	68030, 16 MHz	68030, 40 MHz
FPU and clock speed (megahertz)	opt. 68881, 16 MHz	NA	68882, 16 MHz	68882, 40 MHz
Static-RAM cache	no	no	no	32K direct map
Max. motherboard RAM	512K	8 MB	8 MB	8 MB
Max. accelerator RAM	4 MB	NA	NA	NA
Accelerator RAM wait states	0, 1	NA	NA	NA
Mac ROM placement	on accelerator	NA	NA	NA
Expansion ports	E-Machines video	none	none	Processor Direct Slot
Power supply/fan	NA	NA	NA	NA
Software				
Accelerator disable	no	no	NA	NA
Cache disable	NA	yes	NA	NA
SANE patch	yes	no	NA	NA
RAM disk	no	no	NA	NA
Other software	sound patch	none	none	none
Other				
Warranty	1 year	1 year	1 year	1 year
Manufacturer	Siclone Sales & Engineering Corp. 1515 Centre Pointe Drive Milpitas, CA 95035 (800) 862-2636 (408) 263-8207	Dove Computer Corp. 1200 N. 23rd St. Wilmington, NC 28405 (800) 622-7627 (919) 763-7918	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 (408) 996-1010	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 (408) 996-1010

You can sidestep the slowdown in two ways. One is to choose your accelerator wisely. The Total Systems Gemini series offers a welcome extra — a new SCSI controller with handshaking support. After you've plugged in a Gemini board, you need only install a connector, replacing the battery door on the back of your Plus to provide a new high-speed SCSI connector that can double the speed of your hard-disk drive compared with that of a standard Mac Plus.

The Gemini series is a single design that hosts several configurations, thanks to its separate sockets for 68020 and 68030 microprocessors and affiliated FPU. For $1,045, the Gemini 020 with a 16-megahertz 68020 and a 68881 FPU can give your Plus a performance increase of more than 300 percent. For $2,395, you can get the Gemini 030, which is loaded with a 25-megahertz 68030 and a 68882 FPU, yielding a performance increase of nearly 500 percent and providing the built-in PMMU you'll need for System 7's virtual-memory feature. Another nice touch: On-board jumpers let you change memory wait states. Or you can up the speed simply by swapping the crystal and the programmable gate array and replacing the CPU with a faster version. An optional power supply and fan can help your Plus keep its cool.

SE Special Equipment

The Mac SE takes more kindly to acceleration because it has fewer problems to begin with. There's no insufferable SCSI system holding it back, so nearly every accelerator can deliver decent performance enhancement. The best SE speedup strategy is to balance your dreams with your budget — buy the fastest accelerator you can afford.

The overall best choice is Apple's Mac SE/30 upgrade for the SE. A quick trip to your Apple dealer and $1,699 give you guaranteed Apple

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Table 1: Features of Accelerators, continued

	DayStar 25MHz PowerCard 030 II ¥¥¥¥	DayStar 33MHz PowerCard 030 II ¥¥¥¥	DayStar 40MHz PowerCard 030 II ¥¥¥¥	DayStar 50MHz PowerCard 030 II ¥¥¥¥
List price				
As tested	$1,495 with FPU	$1,995 with FPU	$2,495 with FPU	$2,995 with FPU
Options	NA	NA	NA	NA
Comments	Speedy upgrade for II, IIx, and IIcx. IIcx requires $49 CPU-socket upgrade for soldered-in CPUs.	Faster-model PowerCard for a little more money. Same design and features as 25-MHz version. Very attractive price.	Even faster PowerCard for even more money. Same design and features as 25-MHz version.	Fastest PowerCard has same design and features as 25-MHz version. Almost as fast as IIfx and uses standard Mac II RAM SIMMs.
Macs supported	II, IIx, IIcx	II, IIx, IIcx	II, IIx, IIcx	II, IIx, IIcx
Hardware				
CPU and clock speed (megahertz)	68030, 25 MHz	68030, 33.3 MHz	68030, 40 MHz	68030, 50 MHz
FPU and clock speed (megahertz)	68882, 25 MHz	68882, 33.3 MHz	68882, 40 MHz	68882, 50 MHz
Static-RAM cache	32K set-associative	32K set-associative	32K set-associative	32K set-associative
Max. motherboard RAM	8 MB	8 MB	8 MB	8 MB
Max. accelerator RAM	NA	NA	NA	NA
Accelerator RAM wait states	NA	NA	NA	NA
Mac ROM placement	NA	NA	NA	NA
Expansion ports	DayStar PowerPlane	DayStar PowerPlane	DayStar PowerPlane	DayStar PowerPlane
Power supply/fan	NA	NA	NA	NA
Software				
Accelerator disable	no	no	no	no
Cache disable	yes	yes	yes	yes
SANE patch	yes	yes	yes	yes
RAM disk	yes	yes	yes	yes
Other software	floppy-drive patch	floppy-drive patch	floppy-drive patch	floppy-drive patch
Other				
Warranty	1 year	1 year	1 year	1 year
Manufacturer	DayStar Digital, Inc. 5556 Atlanta Highway Flowery Branch, GA 30542 (800) 962-2077 (404) 967-2077	DayStar Digital, Inc. 5556 Atlanta Highway Flowery Branch, GA 30542 (800) 962-2077 (404) 967-2077	DayStar Digital, Inc. 5556 Atlanta Highway Flowery Branch, GA 30542 (800) 962-2077 (404) 967-2077	DayStar Digital, Inc. 5556 Atlanta Highway Flowery Branch, GA 3054 (800) 962-2077 (404) 967-2077

compatibility, a 16-megahertz 68030 with a 68882 FPU (which yields about a 200-percent performance increase), 8 megabytes of RAM capability, stereo sound, and color QuickDraw. In effect, you get a little Mac IIx lacking only NuBus expansion.

If you're content with all of your SE's resources except its speed, you can beat Apple's best by plugging in Total Systems' $935 Gemini 020 (with FPU), upping the SE's performance by more than 300 percent. Total Systems' Gemini 030 model — although quite a bit pricier at $2,195 with FPU — screams along at nearly five times the SE's best. In fact, our tests showed that the Gemini 030s for both the Plus and the SE beat the next-to-top-of-the-line Mac IIci in nearly every test!

For the most cost-effective speedup, take a look at Siclone's $398 Turbo SE, which delivers a solid 60-percent improvement with its 16-megahertz 68000 and optional 68881. Besides plugging in the board, installation means moving your SE's RAM and ROM to the accelerator — a tiny bit of trouble that gives good gains in performance. Siclone even silk-screens board jumper settings so you can upgrade the Turbo's memory even if you lose the instructions.

Other companies provide the same one-two performance punch of a 16-megahertz 68000 and 68881 FPU at similar or greater list prices — for example, the $395 Aox DoubleTime-16 and the $505 Newer Technology MacSElerator (actually it's the Aox board with a different nameplate and software icon). And if you want to improve the view as you dash down the fast lane, consider the RasterOps ClearVue/SE. RasterOps uses the same 16-megahertz 68000/68881 combination, adds extra RAM and a Texas Instruments 34010 video coprocessor, and throws in a 19-inch 1,024-x-768-pixel two-page monochrome display — all for $1,995.

The Macintosh SE/30 already has a great CPU, so there's little room for

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Table 1: Features of Accelerators, continued

	Dove MaraThon 030/II ⚡⚡⚡⚡	Sicone Si3033 ⚡⚡⚡⚡	Sicone Si3050 ⚡⚡⚡⚡	Total Systems Voyager 030/33 ⚡⚡⚡⚡
List price				
As tested	$699	$1,999 with FPU	$4,295 with FPU	$1,995 with FPU
Options	NA	$1,799 without FPU	$3,795 without FPU	$1,795 without FPU
Comments	Simple, small board has 68030 with twice Mac II's normal speed. Memory cache must be disabled when you format floppy disks.	Speedy upgrade for II or IIx. Retains older CPU to allow downshift to native unaccelerated mode. INIT provided enables proper floppy operation.	Similar to Si3033, much faster, more expensive. INIT provided enables proper floppy operation.	Manufactured by Sicone, identical to Si3033. A 50-MHz version with 50-MHz FPU also available ($4,295).
Macs supported	II, IIx	II, IIx	II, IIx	II, IIx
Hardware				
CPU and clock speed (megahertz)	68030, 32 MHz	68030, 33.3 MHz	68030, 50 MHz	68030, 33.3 MHz
FPU and clock speed (megahertz)	NA	68882, 33.3 MHz	68882, 50 MHz	68882, 33.3 MHz
Static-RAM cache	no	64K direct map	64K direct map	64K direct map
Max. motherboard RAM	8 MB	8 MB	8 MB	8 MB
Max. accelerator RAM	NA	NA	NA	NA
Accelerator RAM wait states	NA	NA	NA	NA
Mac ROM placement	NA	NA	NA	NA
Expansion ports	none	none	none	none
Power supply/fan	NA	NA	NA	NA
Software				
Accelerator disable	no	yes	yes	yes
Cache disable	yes	yes	yes	yes
SANE patch	no	yes	yes	yes
RAM disk	no	no	no	no
Other software	none	floppy-drive patch	floppy-drive patch	floppy-drive patch
Other				
Warranty	1 year	1 year	1 year	1 year
Manufacturer	Dove Computer Corp. 1200 N. 23rd St. Wilmington, NC 28405 (800) 622-7627 (919) 763-7918	Sicone Sales & Engineering Corp. 1515 Centre Pointe Drive Milpitas, CA 95035 (800) 862-2636 (408) 263-8207	Sicone Sales & Engineering Corp. 1515 Centre Pointe Drive Milpitas, CA 95035 (800) 862-2636 (408) 263-8207	Total Systems 99 West 10th Ave. Eugene, OR 97401 (800) 874-2288 (503) 345-7395

improvement. By plugging the tiny $699 Dove MaraThon 030/SE30 into the SE/30's CPU socket, however, you can squeeze out cache-enhanced 32-megahertz performance. We found some compatibility problems when formatting high-density floppies, but you can work around them by turning off the cache.

Tuning Your Mac II

A steady hand and $300 is all it takes to tweak 20 percent more performance from your Mac II. Carefully pry out the 68020 microprocessor, pop in a $259 Dove MaraThon Racer (see StartUp, May '90, page 59) or $299 Orchid MacSprint II cache card, slide the microprocessor on top, and click in the Control Panel a couple of times. For a few hundred dollars more, the Dove MaraThon 030/II accelerator card turns in decent performance (about a 40-percent increase) at a modest price.

For quite a few more dollars, you can plug a top-notch accelerator board into your II, IIx, or IIcx. DayStar offers several CPU upgrades, from the 25MHz PowerCard 030 II ($1,495), which can speed up your Mac II by 60 percent, to the 50MHz PowerCard 030 II ($2,995), which pushes up Mac II performance by 130 percent. Siclone offers two entries in the II and IIx high-end sweepstakes: the $1,999 33-megahertz Si3033 and the budget-busting $4,295 50-megahertz Si3050, which was surpassed in our tests only by Apple's IIfx — the all-round champ.

As long as you're spending real money, you might as well opt for the best. Apple's $2,999 IIfx logic-board upgrade can push your Mac II or IIx to the state of the Macintosh art — in effect, you get Apple's newest CPU packed into your old case. When you're making out your budget, however, don't forget that you'll need the special IIfx RAM. (Apple charges $999 for 4 megabytes; third-party vendors can help you out for a few hundred dollars less.)

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Table 1: Features of Accelerators, continued

	Apple Mac IIci upgrade ★★★★½	DayStar Fast Cache IIci* ★★★★½	Dove MaraThon Racer* ★★★★	Orchid MacSprint II* ★★★★
List price				
As tested	$3,398 with 4 MB of RAM	$995	$259	$299
Options	$2,399 without RAM	NA	NA	NA
Comments	A significant performance booster over IIcx, but requires 80-nsec or faster RAM SIMMs.	Speedy upgrade requiring no software. SANE patch provided for extra speed; INIT/cdev provided disables cache.	A best buy. Simple upgrade offers moderate increase for little money. cdev disables cache for incompatible software.	A best buy. Simple upgrade offers moderate increase for little money. cdev disables cache for incompatible software.
Macs supported	IIcx	IIci	II	II
Hardware				
CPU and clock speed (megahertz)	68030, 25 MHz	NA	NA	NA
FPU and clock speed (megahertz)	68882, 25 MHz	NA	NA	NA
Static-RAM cache	no	64K direct map	32K dir. map/set-assoc.	32K direct map
Max. motherboard RAM	8 MB	8 MB	8 MB	8 MB
Max. accelerator RAM	NA	NA	NA	NA
Accelerator RAM wait states	NA	NA	NA	NA
Mac ROM placement	NA	NA	NA	NA
Expansion ports	cache-card slot	NA	none	none
Power supply/fan	NA	NA	NA	NA
Software				
Accelerator disable	NA	NA	NA	NA
Cache disable	NA	yes	yes	yes
SANE patch	NA	yes	no	no
RAM disk	NA	no	no	no
Other software	none	none	none	none
Other				
Warranty	1 year	1 year	1 year	4 years
Manufacturer	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 (408) 996-1010	DayStar Digital, Inc. 5556 Atlanta Highway Flowery Branch, GA 30542 (800) 962-2077 (404) 967-2077	Dove Computer Corp. 1200 N. 23rd St. Wilmington, NC 28405 (800) 622-7627 (919) 763-7918	Orchid Technology 45365 Northport Loop W. Fremont, CA 94538 (415) 683-0300

*Cache card

If you want to upgrade your IIcx to a IIci, Apple will be happy to help for $2,399 (more if you figure in the cost of the 80-nanosecond RAM the IIci needs). This brain transplant can boost your IIcx's performance by about a third. You'll probably notice the change more in your bank account than on your screen, so we advise you to pass on this upgrade and enjoy your IIcx in its pristine state.

If you're not satisfied with your IIcx's speed, you can get a more pronounced increase in performance with one of the DayStar accelerators. Because the microprocessors of most IIcx's are soldered down, however, you'll have to send your CPU board to DayStar along with $49 to have the company install a socket so you can plug in one of its boards. As you might guess, the pricey DayStar 50MHz PowerCard 030 II provides the biggest speed improvement.

If you have a IIci, you can accelerate it by plugging a $999 DayStar Fast Cache IIci into the waiting socket in the IIci's logic board. The 25-percent improvement in performance is noticeable and makes the IIci an even smoother operator.

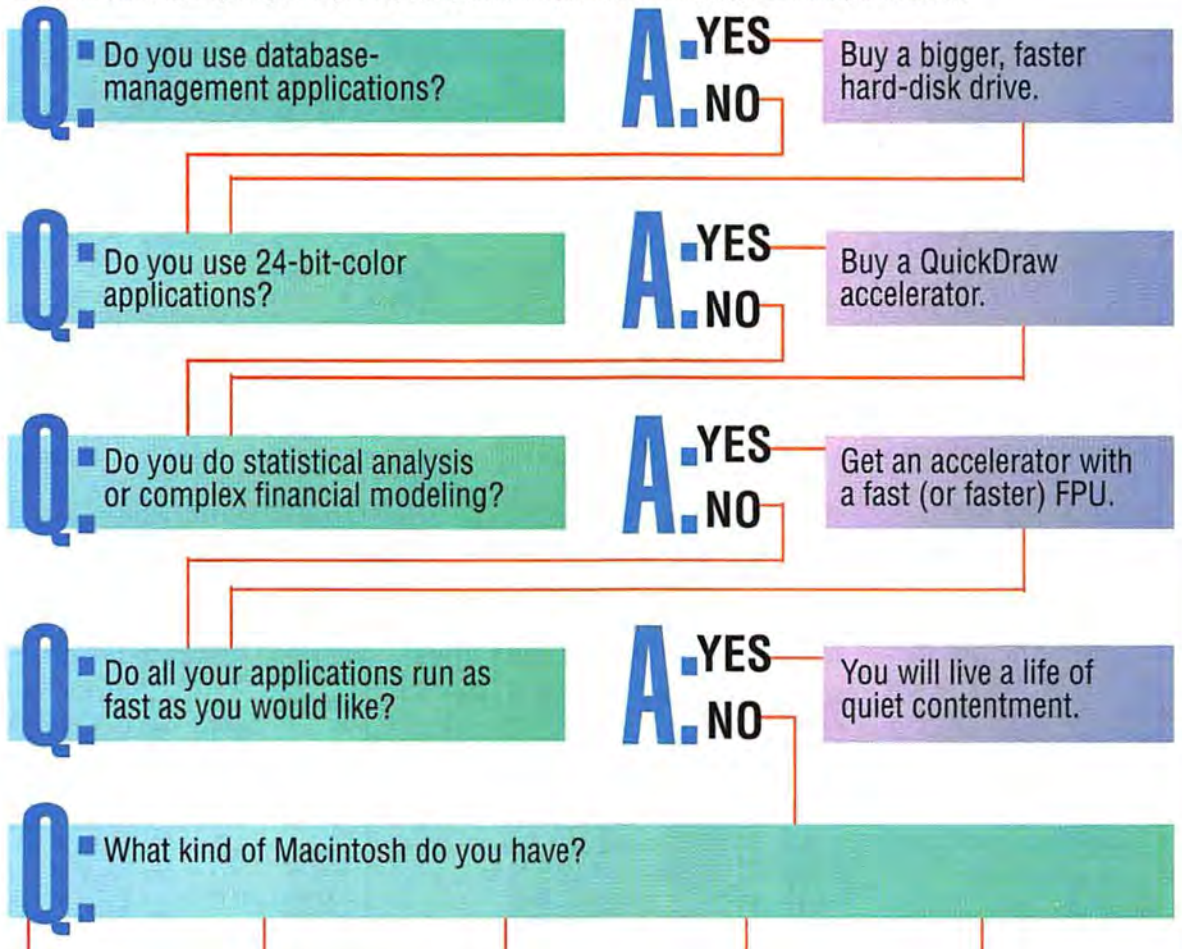
Time Is Money

Not everybody needs a superspeed Mac. If your Mac spends most of its day helping you compose letters, query databases, or handle simple spreadsheet calculations, an accelerator is a luxury, not a necessity. On the other hand, if you spend precious time waiting for complex graphics to appear on your screen or if you tend to nod off during lengthy spreadsheet recalculations, run — do not walk — to your neighborhood dealer and invest in your future. Whether you simply add a cache card or go all out with a IIfx upgrade, you're buying the one precious commodity that's always in short supply — time.

Winn L. Rosch is a veteran *MacUser* contributor and the author of *The Winn Rosch Hardware Bible.*

The Bottom Line

To find the best way to speed your day-to-day work, follow the path that most closely describes your situation.



Mac Plus

Your best bet is the **Total Systems Gemini** line of accelerators. The **Gemini 020 Plus** ($895; $1,045 with FPU) is both cost-effective and speedy, and the **Gemini 030 Plus** ($1,895; $2,395 with FPU) can boost your Plus' performance well past that of a IIci. As an added — and very important — benefit, Gemini accelerators also solve the Plus' SCSI handshaking problems when you add Total Systems' highly recommended **GemKit** option ($150).

Mac SE

The most cost-effective speedup is a 16-megahertz 68000, and the best buy among these is the **Siclone Turbo SE** ($398; $796 with FPU). We also recommend the **RasterOps ClearVue/SE** ($795; $1,995 with two-page monochrome display) for its good acceleration and built-in video support. For maximum compatibility (at a price), try the **Apple Mac SE/30 upgrade** ($1,699; $2,298 with high-density floppy-disk drive).

Mac SE/30

We've always liked the SE/30 just as it is. Even if you can't use it on an airliner, it's still Apple's most powerful "portable" — and for just a dozen extra pounds, you get a readable screen. But if you want to squeeze even more power from a good machine, investigate the **Dove MaraThon 030/SE30** ($699). For a very modest investment, you can increase performance by up to 40 percent.

Mac II, IIx, or IIcx

The most cost-effective accelerators are the **Dove MaraThon Racer** ($259) and **Orchid MacSprint II** ($299) cache cards. For even more of a speedup, try something in the **DayStar** line, the most cost-effective choice being the lowest-priced **25MHz PowerCard 030 II** ($1,495 with FPU). For all-around best performance, however, the clear choice for Mac II and IIx owners is the **Apple Mac IIfx upgrade** ($3,998 with 4 megabytes of RAM; $2,999 without RAM).

Mac IIci or IIfx

The **DayStar Fast Cache IIci** ($995) is a fast, easy, and relatively inexpensive way to increase your IIci's performance by 25 percent. But even when a cache-equipped IIci is screaming along at top speed, a Macintosh IIfx still leaves the IIci in its wake. You can't do better than a IIfx. If you're fortunate enough to have one and you still think you need more speed, consider a workstation, a Cray supercomputer, or psychotherapy.

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Menu sizing	yes	yes
Screen saver	yes	yes
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Full year warranty	yes	yes
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Street Price	$1,695	$897

(Best Street Price 4/1/90) *Mac II, SE/30

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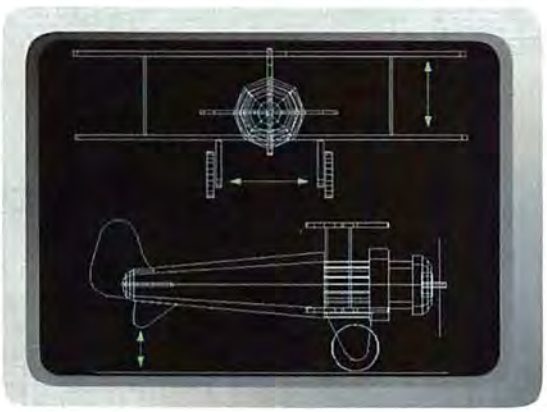
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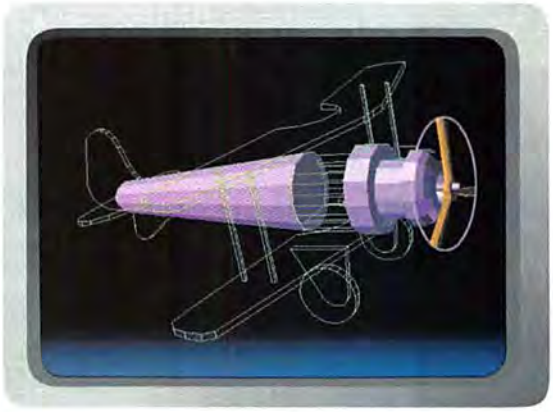
Mac CAD takes off into the jet stream with some exciting new ideas in design, drafting, and 3-D modeling.

BY PHILLIP ROBINSON

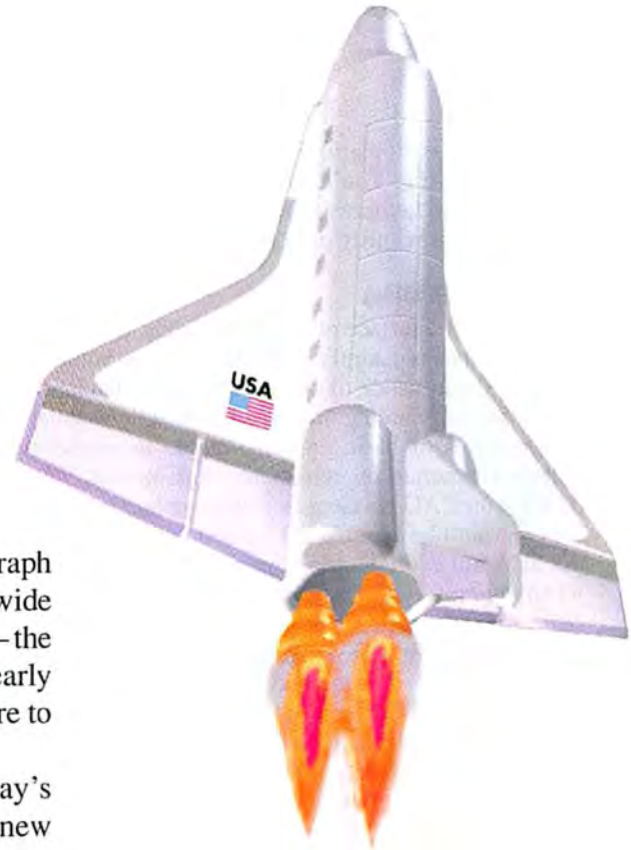
Mac CAD *Takes Off*

The time has passed when the Mac could be dismissed as a design and engineering lightweight. The potent processing speed of the Mac II line was one key to the change. Another key was the general acceptance of graphical user interfaces. Although some users of CAD (computer-aided design) systems turned to the Mac for its own merits, others — more wedded to IBM compatibility — hesitated at first but finally switched to the Mac after PC and workstation CAD heavyweights such as









Autodesk, Versacad, Schlumberger, and Intergraph introduced Mac products. Couple this with the wide variety of midrange choices such as Claris CAD — the most popular Mac CAD package — and it's clearly time for the next generation of Mac CAD software to take off.

And it has. Mac programs that look like yesterday's workstation or PC stuff are obsolete. Old and new CAD developers are busy making CAD easier to use and more comprehensive, extending its reach back to conceptualization and forward to manufacturing, testing, and presentation. They're linking CAD to other programs, stretching it to fit work groups, and customizing it for particular industries. In a world obsessed with "time to market" and "design for manufacturability" (creating products that are easy to manufacture efficiently), Mac-wielding designers and engineers need to squeeze every gram of power from their CAD packages. Five trends in Macintosh CAD that will save you design time and prevent redesign headaches are intelligent interfaces, integration with other products,

ILLUSTRATION JIM LUDTKE



multiuser and multiplatform capabilities, specialty CAD, and 3-D drawing. You'll find these trends both in new versions of old favorites and in some new programs that are charting previously unexplored CAD territory.

Intelligent Drafting

The Mac's interface of windows, icons, and cut-and-paste graphics is central to its CAD success. Some early programs didn't stick to the Mac interface standard, but now most do, building on a MacDraw-style foundation with palettes of basic drawing shapes accompanying pull-down menus of commands and options. (Autodesk's AutoCAD is a clear exception, persisting with the very unMac-like menus and conventions that it sports on the PC.) But even the Mac interface can get confusing when you must choose from among a couple of dozen basic objects, half a dozen drawing methods for each object, and ten or more snapping options for each combination of object and method. The welter of pull-down, pull-out, and pull-up menus; icons; palettes; Command-key combinations; and mouse clicks can hinder, instead of help, the movement of ideas from mind to screen.

But Mac CAD programs are getting smarter. Several new programs fight complexity by adding intelligence to the interface. Instead of making you find the right combination of object, method, and position, these programs anticipate intentions and offer suggestions. Engineered Software's PowerDraw 3.0 has a Dynamic Snap Indicator — a small strip of letters on the drawing window's title bar that indicates when a particular dynamic snap point has been located. (A snap point is a location at which the software completes or fine-tunes a drawing or relationship that hasn't yet been completely or precisely drawn, based on its assumptions about the user's intentions.) For example, a C indicates a center snap, an E an end snap, and a % a percentage of distance along a line-segment snap.

Ashlar's Vellum goes beyond this, setting the pace for interface intelligence with an ever-vigilant Drafting Assistant that watches the active tool, the geometry already on-screen, and the cursor's location. It then processes these observations and its own knowledge base of common constructions through a "geometric inference engine" to determine what you might want to do next. Messages such as "endpoint," "intersect," "align," and "quadrant" appear beside the cursor as it approaches such points on the drawing. You can either draw to these points or ignore the messages. Ashlar is patenting this technology, which could also be used in other applications, such as desktop publishing.

Vellum also features another exciting trend in Mac CAD: parametric drawing. A parametric feature can automatically "resolve" a drawing by resizing and positioning objects to fit a set of constraints. For instance, you

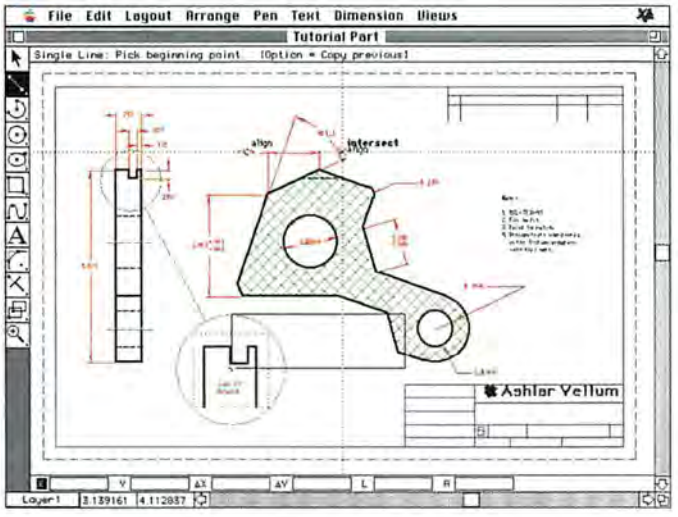


Figure 1: Vellum's Drafting Assistant notices the position of your drawing cursor and tells you when the cursor is near an important geometric location such as an alignment axis, a tangent, an endpoint, or a midpoint. Vellum also has the Mac's first parametric CAD feature — a Resolve command that can redraw an object to fit equations — although parametric abilities have also appeared in products such as FarbCAD; Relational Objects; and vPower, a VersaCAD add-on.

CAD CATEGORIES

2-D

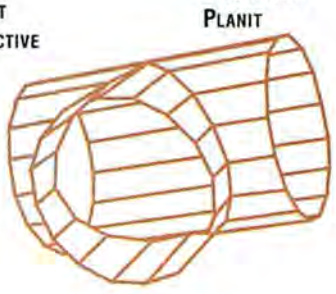
• Drafting
AURACAD
BLUEPRINT
CLARIS CAD
DREAMS
FLEXICAD
GENERIC CADD
MAC LEVEL 1
MACDRAFT
PEGASYS I
PRECISION
RELATIONAL OBJECTS
SNAP!
VERSACAD

• Development environment
TOPCAD

3-D

• General-purpose drafting
AUTOCAD
FARBCAD2D/3D
MACBRAVO!
MACCONCEPT
MACPERSPECTIVE
MINICAD+
PEGASYS II
VERSACAD

• Architectural
ARCHICAD
DYNAPERSPECTIVE
MACARCHITRION
MACINTERIORS
MODELSHOP
PLANIT



Note: Programs in parentheses are the parent programs of add-ons.

can draw a rectangle in Vellum, label one side A and an adjacent side B, give A a length of 2 inches, enter the equation *B = A*3.5*, and choose the Resolve command. Vellum will redraw the rectangle by retaining its 90-degree corners, keeping A at 2 inches, and stretching B and the opposite side to 7 inches (see Figure 1). Parametric constraints can include a variety of other object attributes as well. Parametric technology is already popular in workstation and PC CAD programs for quickly creating families of parts from a fundamental design, for exploring what-if possibilities while sketching a part, and for keeping a design within certain boundaries determined by space and material demands. Vellum is the first program to bring parametrics to the Mac, and along with its intelligent assistant, Vellum has taken the CAD interface to a new level of ease of use.

Claris CAD 2.0, which should be out by the time you read this, takes assistance a step further. Its "graphic guide" not only anticipates probable drawing operations but also automatically chooses a *modifier* (drawing method) that makes sense for the cursor's present position within a drawing. The Guide has a Preview function that changes the cursor to show which modifier is active and how an object will be drawn. It also has a Guideliner function that displays alignment marks when the cursor is between objects. Unlike Vellum's assistant, this Guide doesn't display text messages about the cursor position, instead relying on icon messages. It also differs from Vellum in that it's sensitive to cursor speed: The Guide ignores the cursor when it's moving quickly because it assumes that a fast cursor motion is a move across the screen rather than a search for a drawing point.

Integrated CAD

Mac CAD software is reaching out to other Mac software to share information. Design doesn't mean just drawing pictures; it means organizing and directing all the geometric and textual information that describes a component or product. Sophisticated CAD packages link a database of textual information to the drawing image — information such as materials properties, parts costs, and assembly processes. Historically this approach has appeared as a report or BOM (bill of materials) in mechanical and architectural CAD programs. A BOM details the parts that make up a drawing; changes in the drawing are reflected in the next BOM extraction.

But textual information can also be linked in the other direction, with changes in the text affecting the drawing. (This is how parametric drawing works, as in Vellum's Resolve command.) Currently, there are several ways to create this link — through a built-in database, through an external database, or through HyperCard. When System 7 appears, another way will open: the new IAC (interapplication communication) capability that will provide for

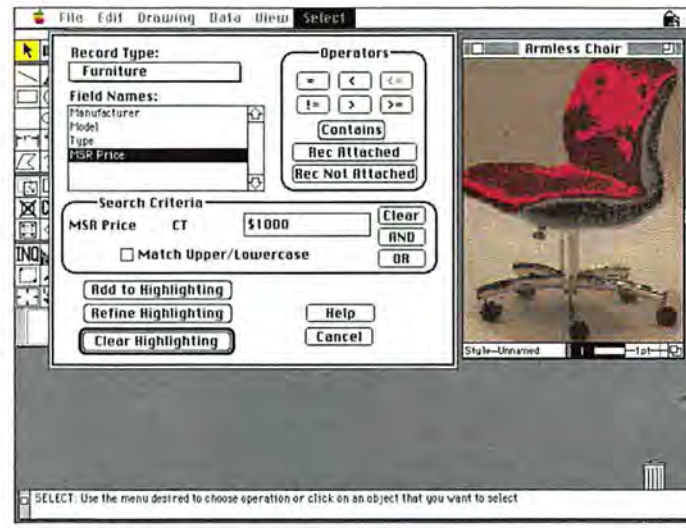
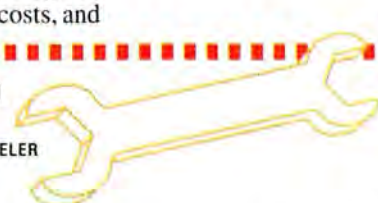


Figure 2: Aperture combines a database manager with a drawing program, letting you search through and report on a design from an associated database.



• Animation
Architrion II
Dimensions 3DProducer
DynaPerspective
Electric Image
StrataVision/Flight
Super 3D
Swivel 3D

• Surface modeling
Chem3D
Dimensions 3DModeler
DynaPerspective
MacBRAVO!
MicroStation Mac
Sculpt 3D
StrataVision 3d
Swivel 3D Professional

• Solids modeling
ArchiCAD
DesignCAD
IN-CAD

Intelligent Interfaces

• Snap points
PowerDraw

• Drawing assistant
Ashlar Vellum
Claris CAD 2.0

Database Integration

• Oracle
MicroStation

• HyperCard
VersaCAD

• Integrated
Aperture
MiniCAD+

direct links between numerous different programs. Claris, for example, is planning to use the IAC ability of System 7 to integrate a variety of its programs, from MacWrite II and MacProject II to FileMaker II and Claris CAD.

Intergraph's MicroStation works not only with other Macintosh programs but also with minicomputer and mainframe data through built-in routines that link to Oracle's database manager. You must buy Oracle separately and then link the two programs to see the MicroStation database commands. Any object in MicroStation can be attached to a database field. You can use SQL commands or Oracle's HyperCard front end to query the database.

Versacad took the HyperCard route with its CAD program, linking an object-oriented database to the drawing through stacks and HyperTalk scripts. Graphsoft added an integrated database — in the form of a spreadsheet — to its venerable MiniCAD drafting package. The spreadsheet contains object size, along with hierarchical class and name identities that MiniCAD+ assigns to objects. There are built-in formulas for engineering calculations as well as commands for manipulating, formatting, and printing cell information. MiniCAD+ also has a macro language, MiniPascal, for more-complex analyses.

Aperture from Aperture Technologies is touted as a "visual-information manager" that does more than draw. This emphasis on teamwork between drawing and database management shows up immediately when you start the program: After the File and Edit menus comes a menu for graphics (Drawing) and another for database management (Data). Any object within a drawing may have an attached database record (see Figure 2). Aperture can search through a drawing via the database, highlighting the corresponding graphic parts or labeling drawing elements from database records. There is a complete list of database commands, from searching and sorting to reporting. Aperture also lets you assign Link Buttons to any object in a drawing: Click on the button, and a specified view of another drawing appears in its own window.

CAD Groupware

Mac CAD is also becoming more social. Design is sometimes a group process in which drawings and information must be shared over a network, but most Macintosh CAD programs still don't make any special provisions for networked design groups. These programs can run on a network, but they don't let you serve drawing information up to more than one Mac simultaneously.

Few CAD programs can freely and transparently provide information to many computers — Macs, PCs, and workstations — on the same network. VersaCAD, on the other hand, uses the same database for its Mac, PC, and workstation versions. The VersaLINK translator moves

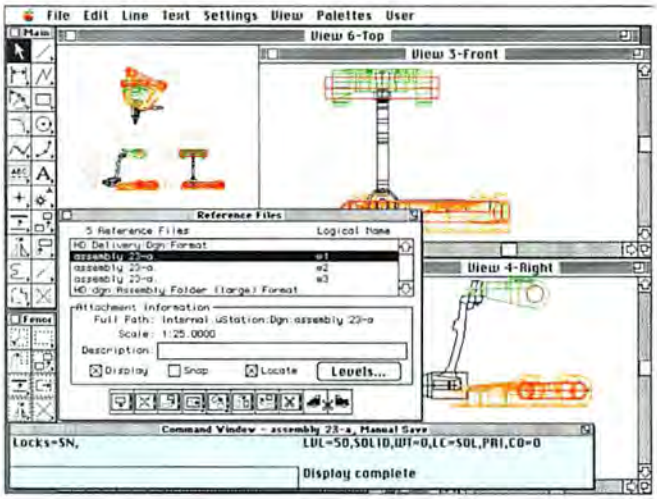


Figure 3: MicroStation Mac represents several trends in Mac CAD, from its built-in links to Oracle database information to its full 3-D drafting and rendering abilities and promised MacRenderMan support. One unique feature that suits MicroStation Mac for use by groups of designers is "reference" files. These read-only drawing images can be viewed and used as a background for design details simultaneously by many designers working on a mix of PCs, Macs, and workstations on a network.

Multiuser/Multiplatform

- PC workstations

AutoCAD
MicroStation
VersaCAD

- VAX

MacBRAVO!
MicroStation

- File compatibility

DXF	*Binary compatibility*
AutoCAD	**AutoCAD**
	MicroStation

Parametrics

FarbCAD
Relational Objects
Vellum
vPower (VersaCAD)

Specialty

- Architecture

Add-ons

ADS MGMStation — Architecture
Architosh (VersaCAD)
ASD Professional CAD Symbol Library
AutoArchitect (AutoCAD)
DCA Architectural Electric
DCA HVAC
DCA Plumbing
Engineering Symbols Library (PICT/MacDraw-compatibles)
LANDCADD
Landscape and Residential Construction (PowerDraw)
MiniReporter (MiniCAD+)
Residential Library (PowerDraw)
VersaCAD Architect

Dedicated

ArchiCAD
ArchiMovie
Architrion II
Design Your Own Home
MacInteriors

VersaCAD and other CAD files among these platforms.

Schlumberger's MacBRAVO! can integrate with Bravo3 running on a VAX. Several users on a network can share CAD database files in MacBRAVO!, using different modules to create their own designs on separate layers. Similarly, AutoCAD's popularity has made its DXF file format a de facto industry standard on the PC, alongside the more official IGES file format. VersaCAD, AutoCAD, and MicroStation run on PCs, Macs, and workstations, allowing different computers on a network to access each other's files. And AutoCAD and MicroStation files don't need any translation to move from one system to the next because they are binary-compatible across all the platforms.

MicroStation is the front-runner for designers working in groups (see Figure 3). It can swap files with MicroStation running on PCs or UNIX workstations and can communicate with Intergraph's VAX-based IGDS (Interactive Graphics Design Software). MicroStation also employs read-only "reference" files as background layers that can be used by all work groups on a network. Up to 32 reference files — which can be viewed but not altered by anyone else on the network — can be attached to each of the 63 levels in a design. These files can show design changes as they occur on every participating platform. Reference files save storage space and allow parallel and cooperative design efforts on a network.

Specialty CAD

General-purpose Mac CAD packages have been pressed into every conceivable design pursuit, including architectural, electrical, mechanical, and organizational applications. If a CAD program is popular enough, it may even attract its own marketplace of add-on templates, routines, extensions, and parts libraries. But a general-purpose program cannot contain all the features and commands demanded by different disciplines without becoming a monstrous lumber room of menus and icons. Even with templates and extensions, a general-purpose program can't match the specialized interface, terminology, and style of the common practice of a particular field.

Specialized programs are often more expensive, however, because they cater to a smaller market. Instead of paying $700 for a general-purpose package that does 80 to 90 percent of what you want, you may have to drop $3,000 or more for a specialty program that can go the extra 5 or 10 percent. There are many from which to choose. The Mac is home to a growing variety of specialized CAD programs for every sort of design, from buildings to boats to boxes to circuit boards, many of which are reflected in the product directory at the end of this article.

Since architects make up approximately 40 percent of Mac CAD users, architecture has prompted the creation of the most specialty tools, ranging from overall-design

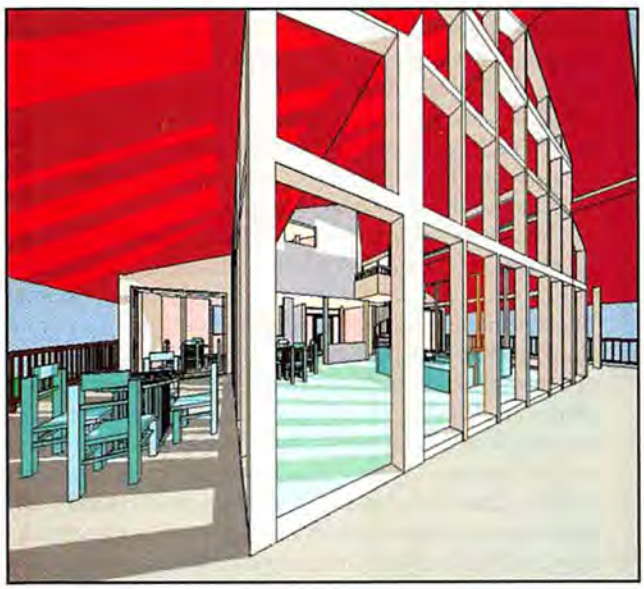
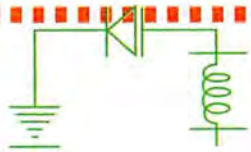


Figure 4: Architrion II is a color 3-D program that lets you cast shadows from a light source (shown here), calculate sequential views, and work in sections and elevations.



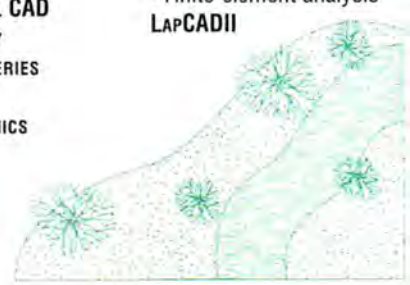
• Biochemistry/chemistry
ChemDraw
Gene Construction Kit
DNA Inspector IIe

• CAM
auraCAD
EZ-CAM
Gibbs System

• Electrical
ADS-MGMStation — Electronics
ASD Professional CAD Symbol Library
BV Engineering Series
DesignWorks
Douglas Electronics
DragonWave
Extend
MacAbel
MacAC
Vamp

• Fashion
ModaCAD

• Finite-element analysis
LapCADII



• Geographic/topographic/landscape
Architosh Land
LANDCADD
Landscape Library (PowerDraw)
MacCivil
MapGrafix

• Packaging
Ovation CAD/CAM

• Marine
MacSurf

tools to structural-analysis, landscape-layout, and rendering packages. Add-ons, such as AutoArchitect from DCA Engineering Software and Architosh from E.T. Vermurlen & Associates, can tailor a general-purpose program for architectural work. AutoArchitect extends AutoCAD, adding tools for editing in plan, elevation, and three dimensions; programs for automating the design of walls, roofs, windows, foundations, and stairs; symbol libraries with plumbing, electrical, furniture, and other appropriate symbols; and a project-scheduling program. Architosh is a set of 2,000 architectural symbols for VersaCAD, grouped in libraries for landscaping; floor plans; elevations; and mechanical, electrical, and other purposes. Versacad offers its own add-on, VersaCAD Architect, that tailors that general-purpose program for architecture. Engineered Software sells Landscape and Residential Construction symbol libraries for PowerDraw. MiniReporter from Valle Anderson Associates generates design-project reports from MiniCAD+ drawings. The Engineering Symbols Library from Northstar Engineering Design works with any Mac CAD package that handles PICT or MacDraw images.

There are also programs built from the ground up for architecture. Gimeor's Architrion II is a 3-D-CAD package for every phase of architectural design, from creating the schematic through planning and designing working drawings to obtaining building permits. It offers a different metaphor for conceptualization than do most CAD programs. Where general-purpose design programs create and place drawing primitives, Architrion creates and angles volumes — an approach that attracts some and baffles others (see Figure 4). Architrion also offers features that are limited or lacking in general-purpose packages, such as the ability to generate 3-D perspectives and cross sections, calculate building and room areas, and simulate shading (shadow-casting) and lighting from a light source. Gimeor's separate ArchiMovie program can animate scenes from Architrion for presentations.

ArchiCAD from Graphisoft offers a nearly identical set of features, working with plans, elevations, and sections in the terms architects expect from a palette of slabs, roofs, and walls. Like Architrion, it has a comprehensive BOM feature — a database connection that's vital in architecture — for managing materials and analyzing the cost of a design. Unlike with Architrion, however, you work in two dimensions and extrude for 3-D effects, although ArchiCAD models solids and produces true cross sections.

Electrical and electronic engineering is another big slice of the Mac CAD pie. There are specialized programs for sketching, detailing, analyzing, simulating, and manufacturing electrical and electronic circuits and devices. The sketching and detailing can be done with general-purpose programs, and there are symbol libraries and

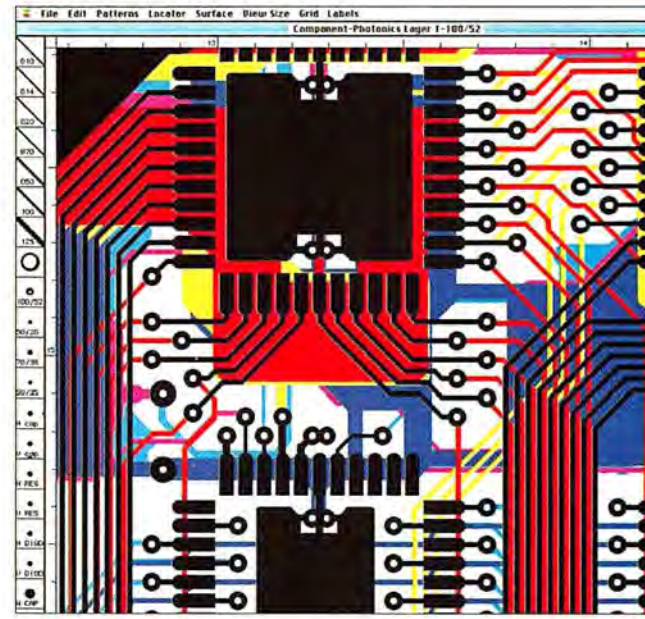


Figure 5: The Douglas CAD/CAM System is a family of software modules that can capture and analyze a circuit and then translate the design into a PCB (printed circuit board) layout, shown here. Douglas can also make prototype PCBs for you directly from your finished disk files.

CAD DIRECTORY

The range of Macintosh CAD and related products has grown wider, deeper, and more diverse than you might imagine. The 60 companies listed here represent a comprehensive sampling of what's out there, but the number of vertical applications available could easily have extended our list to more than 200 companies. The range of products listed includes mechanical, structural, and electronic-design software; products for visualization and modeling; plotter utilities; symbol libraries; simulation packages; file translators for CAD and non-CAD translation; and products for other specialty areas such as gene modeling and apparel design.

The CAD universe includes everything from simple 2-D drawing tools with basic CAD features to full-blown 3-D design and modeling packages that have features rivaling those found on any other platform. In the 3-D world, visualization products unique to the Mac often provide full animation capability and are beginning to support Pixar's RenderMan 3D scene description language. That bodes well for the continued vitality of 3-D CAD on the Mac.

Additional CAD listings for more-specialized products are available in a longer catalog of CAD options called *The Apple Engineering/Scientific Solutions Guide (Winter 1989/90)*, available from your local Apple Engineering Reseller for $8.95 (to find the number for your local reseller, call [800] 538-9696, ext. 600).

— David Peltz

add-ons for electronics work, just as there are for architectural tasks. For example, Imagine That's Extend can simulate many different types of systems, including electrical circuits. It lets you link logical boxes with defined behavior (such as A/D converters and amplifiers) into block diagrams on-screen and then tells you how the entire diagrammed system will act. And Compu-Arch's ADS-MGMStation — Electronics, for instance, offers 15 libraries of electromechanical and electronic symbols for MGMStation. But for all the steps from analysis to manufacture, only the dedicated programs will do.

BV Engineering makes a dozen circuit-analysis programs; Capilano Computing's DesignWorks is an integrated schematic-diagram and digital-logic simulator; San Juan Software's MacAC is an analog-circuit simulator; Nedrud Data Systems' DragonWave helps analyze and optimize microwave circuits. Both Vamp and Douglas Electronics offer software for translating finished logical-circuit designs into physical designs — as layouts for printed circuit boards (see Figure 5). Douglas can even manufacture prototype boards directly from Mac files.

Some other fields don't have the number of CAD programs you'll find for architects or electronic engineers, but they still possess Mac specialties. Textco sells The DNA Inspector IIe for people who work with biochemistry and DNA sequencing. Cambridge Scientific Computing's ChemDraw helps chemists create and manipulate molecular models. ModaCAD sells a powerful series of fashion-design programs.

Innovative Design Systems' Ovation CAD/CAM is a packaging CAD program. It opens with a design interface that offers the standard configurations of line styles and bridging patterns for packaging. Its CAM portion can send the result to plotters, routers, or commercial laser systems. Graphic Magic's MacSurf is a 3-D surface-modeling program for marine design. MacSurf offers modules for designing and analyzing the hull on anything from a supertanker to a dinghy. Neither its commands nor its links to other marine-analysis programs can be found in any general-purpose package. MacSurf is also used for aerospace and automotive design.

3-D Surfaces and Solids

Many new and old Mac CAD programs are showing another side — reaching to three dimensions. Most CAD is two-dimensional, and most Mac users still work in 2-D — even though real-world objects are 3-D. Few Mac design programs have catered directly to 3-D design until recently because 2-D programs can tackle many problems and the complexity of 3-D calculations slows processing considerably. But the arrival of the Mac IIci and IIfx has decongested the processing bottleneck. (If you don't have a high-end CPU, check out the MacUser Labs report on accelerators in this issue.) And the push in industry toward "design for manufacturability" is making 3-D more necessary. Seeing the model in the most realistic form as soon as possible reduces the number of late changes and fixes needed in a design.

The world of three dimensions includes programs aimed at 3-D drafting (MiniCAD+, MacBRAVO!, and MicroStation Mac), 3-D conceptualization (such as Super 3D from Silicon Beach and Paracomp's Swivel 3D), 3-D surface modeling (such as DynaWare's DynaPerspective, shown in Figure 6), and solids modeling (such as DesignCAD — formerly called Origins — from the company of the same new name, and Infinite Graphics' INCAD). Some of the drafting packages include surface- and solids-rendering features. Some modeling programs — such as DesignCAD — contain many drafting features. There are even specialized 3-D packages for architecture, such as ArchiCAD and Architrion. Paracomp's ModelShop is a 3-D surface modeler for architectural conceptualization. MacInteriors, from Microspot, is an interior-design and space-planning tool. DynaPerspective is a 3-D conceptualizing program that not only offers primitives and editing tools for creating static models but can also animate models for fly-by or walk-through sequences. VIDI's Dimensions 3DProducer has similar features for animation.

DesignCAD Macintosh is compatible with A/UX and includes real-time rotation ability and sophisticated shading for a lower price than that of many 2-D drafting programs. Swivel 3D can constrain the motion of 3-D

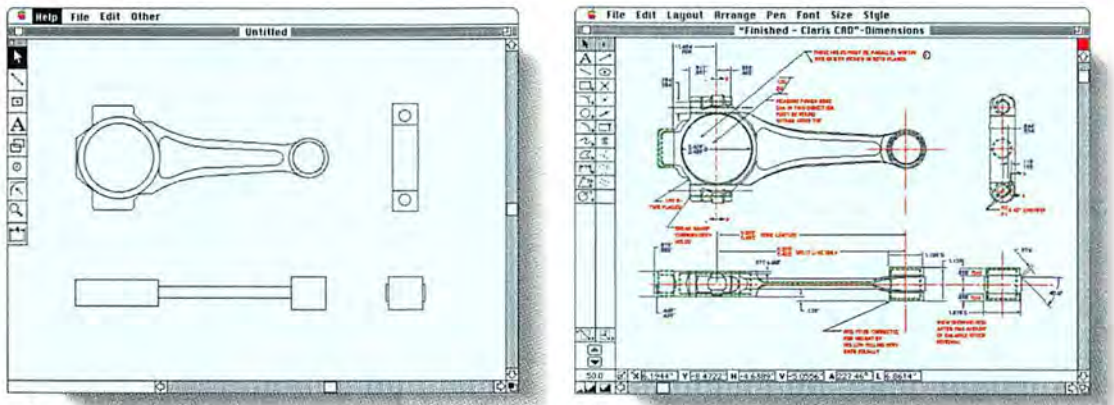
• Abracadata Ltd.
P.O. Box 2440
Eugene, OR 97402
(800) 451-4871
(503) 342-3030
Design Your Own Home 1.2, $99.95
This low-priced program for both homeowners and professionals combines drawing tools and predrawn objects for creating architectural plans.

• Advanced System Design, Inc.
P.O. Box 3131
Evergreen, CO 80439
(303) 674-2222
ASD Professional CAD Symbol Library 2.0, $119.95
Architectural, electronic, and general symbol libraries of more than 3,000 symbols for MacDraw II, Claris CAD, Canvas, and PowerDraw.

• Amiable Technologies, Inc.
3508 Market St., Suite 210
Philadelphia, PA 19104
(800) 422-3539
(215) 222-9066
FlexiCAD 2.0, $1,495
A comprehensive 2-D CAD program with extensive features. An intelligent front end is currently under development. Version 3.0 will exploit Apple's System 7.

• Aperture Technologies, Inc.
84 W. Park Place
Stamford, CT 06901
(800) 342-9022
(203) 975-7587
Aperture Visual Information Manager 1.07, $795
A 2-D CAD package fully integrated with a built-in database-management system that has a HyperCard-like linking system between files.

Why we're the number one draft choice.



In the time it takes to get started with other CAD packages, you can be presenting your completed design with Claris CAD.

Performance.

Claris® CAD is the fastest, smoothest way to go from concept to final drawing. Exactly why we're consistently first in independent comparisons on features, graphics speed, and ease of use. Only Claris CAD takes full advantage of the natural intuitiveness of the Mac. So there are no confusing dialog boxes or hidden commands.

Everything's right there in front of you. Powerful 2D design and drafting features like advanced geometric construction, cross hatching, automatic dimensioning, and complete text control.

CLARIS



Claris CAD

Professional design and drafting for the Macintosh.

All backed by full technical support from Claris. Plus support for industry standards like ANSI Y14.5, IGES, DXF, and PICT.*

So it's no wonder we've scored big points. Claris CAD ranked higher in user satisfaction than any other Macintosh CAD package in a recent IDC survey. *MacWeek* saluted us as one of the twelve best Mac products of 1989.



Call 1-800-544-8554, ext. 44, for our trial kit—a guided video and software tour for $29.95.**

And see why we're the only player with major league credentials.

CLARIS

New Version 2.0 with "Graphic Guide"

Upgrade from 1.0 to 2.0 for only $79! Call 1-800-544-8554, ext. 44 for details. Offer good only in U.S.A. © 1990, Claris Corporation. All rights reserved. Claris is a registered trademark of Claris Corporation. Mac and Macintosh are registered trademarks of Apple Computer, Inc. DXF is a trademark of Autodesk, Inc. *IGES and DXF are supported by the Claris Graphics Translator. **Refundable by Claris on proof of purchase of Claris CAD. Offer good only in U.S.A.

models to simulate real mechanical models more accurately. For example, a model of a robot arm can be restricted to those motions that the arm's joints allow.

IN-CAD, from Infinite Graphics, builds its solid modeling on CSG (Constructive Solid Geometry). Where 3-D surface-modeling software doesn't understand the volume that objects occupy, CSG does. This means, for instance, that IN-CAD can quickly calculate the mass properties of a design, such as the center of gravity and the moment of inertia. IN-CAD models are also in great shape to transfer to CAM (computer-aided manufacturing) programs because they already contain information about volume. Infinite Graphics is the first Mac CAD supplier to promise a direct connection to its Desktop Manufacturing module, a link from IN-CAD to one of the new machines that can directly cut, laser-cure, or sinter (melt) a 3-D prototype part from the Macintosh CAD file. Also, with IN-CAD the designer can check for interference between parts and for the fit between them, something surface modeling does not easily allow.

But solids modeling demands more work from the processor than does surface modeling, so anyone interested in a quick animation of a model might prefer DynaPerspective to IN-CAD. The rendering abilities of surface- and solids-modeling packages may be standardized in accordance with the new Pixar MacRenderMan specification. Intergraph's MicroStation Mac and Paracomp's Swivel 3D will support MacRenderMan, for example. Standardization will make it easier to move rendered images from one program to another, as in multimedia presentations created in programs such as MacroMind Director Interactive.

Choice CAD Choices

You may not get all you want in a single CAD package. Architects, for instance, might like the third-party market around AutoCAD; appreciate the architectural foundation and focus of Architrion II; lust after the intelligent interface of Vellum; thrill to the animations of DynaPerspective; and dream of the seamless network with PCs, Macs, and workstations that MicroStation Mac offers.

Other disciplines will have similar wish lists — wanting the best of mainstream packages and innovative programs. For now you can either stick with one program or cobble together a system from several components — such as using Vellum for initial sketching, MicroStation Mac for final drafting, and DynaPerspective for animating a presentation. Vellum and MicroStation also make a good team, embodying most of the cutting-edge trends in Macintosh CAD. Look to see these ideas take flight in the next version of your favorite CAD programs.

Phillip Robinson is a former technician and engineer who has been reviewing and consulting on CAD for the past ten years.

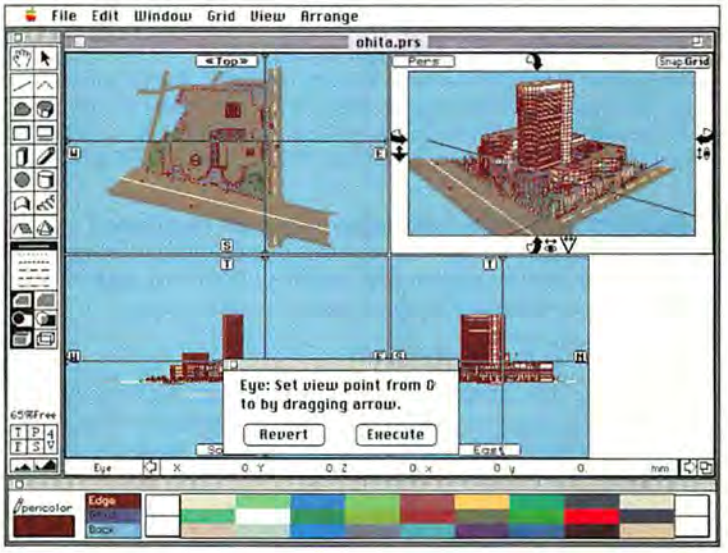


Figure 6: DynaPerspective is a surface-modeling and animation program that can be used for fly-by and walk-through presentations of designs. You control the perspective of the model and your "eye" position for the views, as shown in this figure.

• Ashlar, Inc.
1290 Oakmead Parkway, Suite 218
Sunnyvale, CA 94086
(408) 746-3900
(408) 746-0894
Ashlar Vellum 1.0, $995
Vellum is a 2-D CAD product with an intelligent front end and built-in parametrics. A 3-D version is under development. Symbol libraries are available from Ashlar.

• Aura CAD/CAM, Inc.
2335 Alaska Ave.
El Segundo, CA 90245
(213) 643-5300
(213) 536-9207
auraCAD 2.5I release 2 *(black-and-white),* $999
auraCAD 2.5II release 2 *(color),* $1,399
auraMILL 2.2II, auraTURN 1.9, auraPUNCH 1.8, auraWIRE 2.2II, auraROUTER 2.2II, auraFLAME 2.2II, aura-LASER 2.2II, $7,000 for first module; $1,000 for each additional CAM module
auraCAD is a 2-D CAD program with extensive mechanical-design features. A 3-D version is under development. The auraCAD/CAM modules provide numerical-control machining capability in addition to CAD.

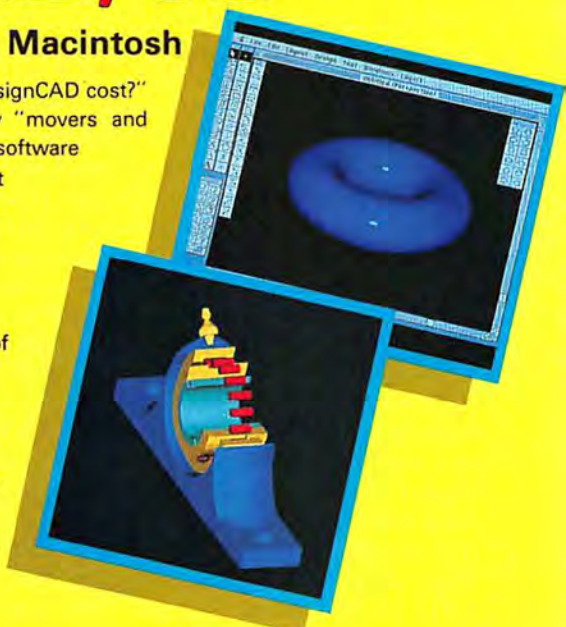
• Autodesk, Inc.
2320 Marinship Way
Sausalito, CA 94965
(415) 332-2344
AutoCAD, $3,000
An extensive full-3-D (only) CAD program available on several platforms.

• BETA, Inc.
Vision Software Division
1223 Peoples Ave.
Troy, NY 12180
(518) 271-5118
vPower, $799
vPower is a VersaCAD add-on that lets users of VersaCAD 2.0 edit objects by using parametric modeling based on formulas and values.

AW...WHAT THE HECK!

DesignCAD 2D/3D

Professional CAD System for the Macintosh



When we introduced this product we had to ask ourselves, "What should DesignCAD cost?" To help with our decision we hired accountants. We consulted with industry "movers and shakers". We purchased the finest spreadsheets available. Many people said, "The software should sell for $3,000.00 or more." Others said, "It's good, darn good—sell it for at least $2,000.00." Opinions varied. Finally we said, in the Great American Tradition, "Aw... What the Heck! Let's see the competition beat this **$699.00.**

DesignCAD has disproved a common misconception about computer software: you don't always have to spend a lot of money to get high-power quality software. DesignCAD for the Mac has features of CAD systems costing thousands of dollars! Yet, DesignCAD is priced at least 50% to 80% BELOW comparable CAD packages... **AND DESIGNCAD IS BETTER!**

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DesignCAD offers fully integrated 3D geometry!

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Tests prove that DesignCAD's user-friendly interface allows you to quickly produce complicated drawings in a fraction of the time required from the competition. Flexibility and power found within DesignCAD means you save **time** and **money**! DesignCAD is truly the CAD system that ANYONE can use!



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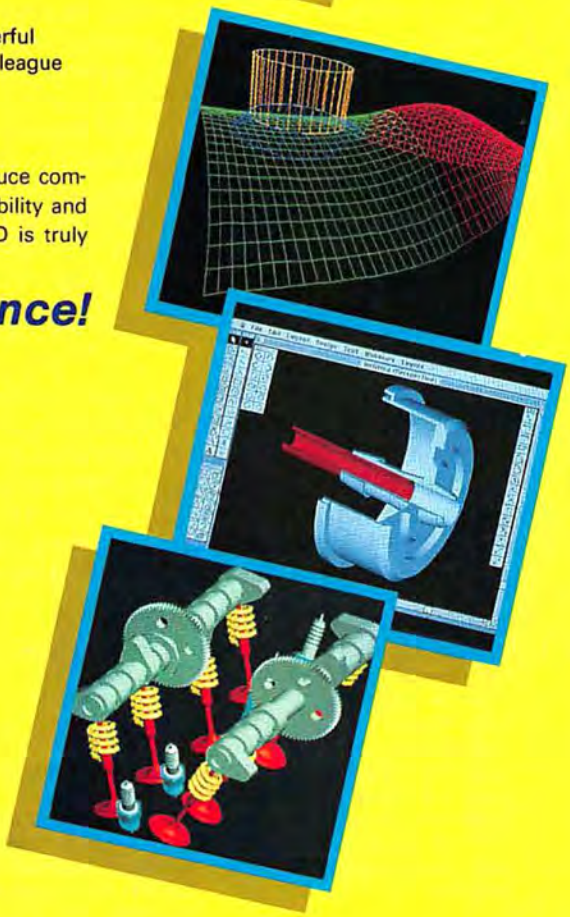
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- Tolerance options for Dimensioning
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- Cubic Spline Geometry
- Bi-Cubic Surface Geometry
- Trimming
- Related and/or Auto-Update Viewing
- "Real-Time Rotation"
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• Bridgeport Machines, Inc.
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Bridgeport, CT 06606
(800) 243-4292
(203) 367-3651
EZ-EDM 5.0 *(electrical-discharge machine)*, $3,000
EZ-MILL 5.0 *(mill-machining centers)*, $3,000
EZ-SURF II 5.0 *(sculptured-surface machining)*, $6,000
EZ-TURN 5.0 *(NC turning centers)*, $3,000
The EZ-CAM family is a numerical-control programming environment that supports all CNC machines.

• BV Engineering
2023 Chicago Ave., Suite B13
Riverside, CA 92507
(800) 229-0283
(714) 781-0252
ACNAP 3.62 *(AC analysis)*, $349.95
ACTFIL 2.34 *(active-filter analysis and design)*, $124.95
DCNAP 2.52 *(DC analysis)*, $199.95
LCFIL 1.06 *(passive-filter analysis and design)*, $149.95
LOCIPRO 2.14 *(root-locus analysis)*, $149.95
LSP 1.05 *(logic simulation)*, $124.95
PCPLOT 3.13 *(screen graphing)*, $125
PDP 2.03 *(pen-plotter graphing)*, $95
SPP 2.50 *(signal processing)*, $349.95
STAP 2.10 *(thermal analysis)*, $125
XFER 2.00 *(transfer-function synthesis and analysis)*, $124.95
Tools for electronics engineers. Each module handles a different phase of electronic design.

• Byte By Byte Corp.
Arboretum Plaza II, Suite 150
9442 Capital of Texas Highway N.
Austin, TX 78759
(512) 343-4357
Sculpt 3D 1.0, $1,500
A 3-D visualization product with extensive rendering and modeling facilities.

• Cambridge Scientific Computing, Inc.
875 Massachusetts Ave., Suite 41
Cambridge, MA 02139
(617) 491-6862
ChemDraw 2.1.3, $595
Chem3D 2.0.1, $595
Chem3D Plus 2.0.1, $895
ChemDraw is a drawing program for chemists that uses a freehand spline tool as well as specialized tools for showing chemical structures, such as cyclohexane and benzine rings and orbitals. Chem3D is a molecular-modeling system that lets you build and view models in three dimensions and animate them. Chem3D Plus adds color and energy minimization using MM2.

• Capilano Computing Systems Ltd.
1168 Hamilton St., Suite 501
Vancouver, BC V6B 2S2
Canada
(604) 669-6343
DesignWorks 2.5, $995
MacAbel 1.0, $2,350
DesignWorks is a product for electronics engineers that provides schematic capture and interactive digital simulation. MacAbel is a compiler that converts a high-level-language description of a circuit into code for a programmable logic device.

• Claris Corp.
5201 Patrick Henry Drive
P.O. Box 58168
Santa Clara, CA 95052
(408) 987-7000
MacDraw II 1.1, $395
Claris CAD 2.0, $899
Claris Graphic Translators (CGT) 1.0, $299
MacDraw II is a 2-D drawing program sometimes used for basic CAD applications in business, design, and engineering. Claris CAD is a 2-D professional CAD tool with extensive features and an intelligent front end. CGT provides translators for importing and exporting among Claris CAD, PICT, DXF, and IGES formats.

• ComGrafix, Inc.
620 E St.
Clearwater, FL 34616
(800) 448-6277
(813) 443-6807
MapGrafix 2.2, $8,500
MapView 2.2, $495
MapLink 2.2, $495
MapGrafix Display 2.2, $850
A comprehensive geographic-information system that provides a dynamic and efficient method of capturing, managing, analyzing, and displaying geographic data. MapView is a coordinate- and map-projection module, MapLink is a translation module, and MapGrafix Display is a run-time display-only version of MapGrafix.

• Compu-Arch
9348 Civic Center Drive, Suite 101
Beverly Hills, CA 90210
(213) 312-6632
ADS MGMStation — Architecture 1.1, $195
ADS MGMStation — Interiors 1.1, $195
ADS MGMStation — Mechanical 1.1, $195
ADS MGMStation — Electronics 1.1, $195
Add-on symbol libraries containing 400 to 600 symbols per library, all created to ANSI standards, that work with MGMStation.

• D.C.A. Engineering Software, Inc.
7 Liberty Hill Road
Henniker, NH 03242
(603) 428-3199
Auto-Architect 10.30, $995
DCA HVAC *(heating, ventilation, and air conditioning)* ***10.30***, $395
DCA Architectural Electric 10.30, $395
DCA Plumbing 10.30, $395
MacCivil 10.21, $1,995
Auto-Architect tailors AutoCAD for professionals in architecture, architectural engineering, facilities management, space planning, and construction. The DCA modules handle specific mechanical applications. MacCivil is a program with tools for coordinate geometry, road design, sewer and drainage design, and topography. All require AutoCAD.

• DesignCAD Inc.
327 S. Mill
Prior, OK 74361
(918) 825-4848
DesignCAD 2D/3D 1.0, $699
Formerly called Origins, this updated product is a general-purpose CAD package with 2-D drafting, 3-D rendering, and complex-surface geometry for aerodynamic designs. Makes an excellent front end for animation.

• Douglas Electronics
718 Marina Blvd.
San Leandro, CA 94577
(415) 483-8770
Douglas CAD/CAM Professional 6.5, $3,195
A CAD program for the design of printed circuit boards. It includes modules for schematic capture, circuit-board layout and manufacturing, and auto-routing.

• Dynaware
1163 Chess Drive, Suite J
Foster City, CA 94404
(800) 444-3962
(415) 349-5700
DynaPerspective 2.0, $995
A 3-D conceptualization and visualization program with animation capability, primarily for architecture, engineering, and construction.

• Electric Image
9690 Telstar Ave., Suite 225
El Monte, CA 91731
(818) 444-1819
Electric Image Animation System *(beta)*, $7,495
A 3-D rendering and animation package that includes reflection and texture mapping.

• Engineered Software
615 Guilford-Jamestown Road
P.O. Box 18344
Greensboro, NC 27419
(919) 299-4843
PowerDraw 3.0, $795
PowerDraw 3.0 Translator 1.0, $275
MacPlots II 2.51, $250
Landscape Library, $79
Residential Library, $199
PowerDraw is a 2-D CAD program with a host of features, including an interactive snap function that aids in geometry creation. PowerDraw 3.0 Translator provides import/export and file-type conversion among many formats. MacPlots II is a comprehensive pen-plotting program. The libraries work with PowerDraw.

• E.T. Vermurlen & Associates Architecture, Inc.
2111 Burton St. S.E.
Grand Rapids, MI 49506
(616) 247-4809
Architosh Land 1.0, $995
Architosh 2.1, $795
Architosh Land is a design package for landscape architects. Architosh is a comprehensive symbol-library package for architects, with more than 2,000 symbols.

• Farb Systems, Inc.
7120 Windsor Lake Parkway
Loves Park, IL 61111
(815) 282-2112
FarbCAD 2D 1.0, $249
FarbCAD 2D/3D 1.0, $495
FarbCAD 2D/3D with DXF translator 1.0, $995
FarbCAD 2D/3D with Parametrics 1.0, $2,495
FarbCAD 2D/3D with Parametrics and DXF translator, $2,995
FarbCAD is a general-purpose professional-level CAD system. Its parametric capability is its key feature.



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• Forthought, Inc.
P.O. Box 32
Sunset, SC 29685
(803) 878-7484
SNAP! 3.1, $695
SNAP!/Intergraph Translator 3.1, $195
SNAP!/DXF 1.0, $195
This general-purpose 2-D CAD program with file transfer to and from Intergraph CAD is primarily for AEC applications, but it can also be used for mechanical design and facilities management as well as other functions.

• Generic Software, Inc.
11911 North Creek Parkway S.
Bothell, WA 98011
(800) 228-3601
(206) 487-2233
Mac Level 1 1.1, $149.95
Generic CADD 1.0, $595
Symbol Libraries, $24.95 to $74.95
Mac Level 1 is an inexpensive low-end CAD program with a floating-point precision database. Generic CADD is Generic's new full-featured general-purpose 2-D CAD program that can be used from initial sketches to output of production-quality drawings. The libraries are used with Mac Level 1.

• Gibbs & Associates
9320 Deering Ave.
Chatsworth, CA 91311
(800) 654-9399
(800) 345-9681 (in CA)
Gibbs System *(ncCAD, ncCAM, ncPost, ncSurfaces, ncExchange)* ***3.2,*** approximately $7,000
A three-axis CAM package developed for machinists and numerical-control programmers.

• Gimeor, Inc.
420 10th St.
Washington, DC 20003
(202) 546-8775
MacArchitrion 4.0 *(black-and-white),* $995
Architrion II, series 5, $3,400
ArchiMovie 3.8.1, price unavailable at press time
MacArchitrion is a black-and-white architectural 3-D CAD package. Architrion II adds color and shadow casting, calculates sequential views, and lets you work in sections and elevations. ArchiMovie lets you animate scenes from Architrion for presentations.

• Graphic Magic Pty Ltd.
P.O. Box 185
Cottlesloe 6011
Perth, Western Australia
(09) 383-2114
MacSurf 4.4, $4,500
This 3-D CAD program for boat-hull design has aerospace- and automobile-industry applications as well.

• Graphisoft
400 Oyster Point Blvd., Suite 517A
South San Francisco, CA 94080
(800) 344-3468
(415) 266-8720
ArchiCAD 3.42, $3,950
topCAD 1.3, $1,000 (with ArchiCAD); $4,800 alone (European prices)
PlotMaker 1.06, $495
ArchiCAD is a solids-based architectural 3-D CAD program with rendering, sectioning, and quantitative features. topCAD is a customizable 2-D CAD development environment with the most features available in a Mac CAD product (it will not be marketed in the U.S. until 1991). PlotMaker is a stand-alone program for editing, laying out, and scaling CAD files on all standard architectural and engineering plotter sheet sizes.

• Graphsoft, Inc.
8370 Court Ave., Suite 202
Ellicott City, MD 21043
(301) 461-9488
Blueprint 1.0, $295
MiniCAD+ 2.0, $695
Blueprint is a 2-D CAD package whose files are compatible with MiniCAD+. MiniCAD+ is a 2-D/3-D CAD package that has spreadsheet and database capabilities.

• IGC Technology Corp.
3555 Jackson St., Suite 200
San Francisco, CA 94118
(415) 563-3612
Pegasys I 3.2.4, $695
Pegasys II 3.2.3, $1,795
Pegasys I is a general-purpose 2-D CAD package. Pegasys II is a general-purpose 2-D/3-D CAD package with macros and a bill of materials.

• Imagine That, Inc.
151 Bernal Road, Suite 5
San Jose, CA 95119
(408) 365-0305
Extend 1.1J, $495
Extend Manufacturing Library, $295
Extend is a performance-simulation application that can be used to do what-if analyses on electronic, mechanical, physical, and mathematical systems. The manufacturing library contains blocks geared toward the manufacturing process.

• Infinite Graphics, Inc.
4611 E. Lake St.
Minneapolis, MN 55406
(612) 721-6283
IN-CAD 1.1.1, $2,495
This 3-D CAD system with workstation roots uses solids modeling and produces fully rendered views as well as working drawings. Future versions will have stereolithographic capabilities.

• Innovative Data Design, Inc.
2280 Bates Ave., Suite A
Concord, CA 94520
(415) 680-6818
MacDraft 2.0, $299
Dreams 1.1, $500
MacDraft is a low-end 2-D drawing and design system with a host of features for transferring images to non-CAD applications. Dreams is a 2-D drawing and drafting system with additional features.

• Innovative Design Systems Corp.
150 N. Miller Road, Building 250B
Akron, OH 44313
(216) 836-0006
Ovation CAD/CAM 5.0, $10,000 to $30,000
Ovation Graphics 5.0, $2,500
Ovation is a 2-D CAD system primarily for packaging design. Ovation Graphics lets you import or create PostScript-compatible images in your design and import DXF files.

• Innovative Systems, Inc.
171 Interstate Drive
West Springfield, MA 01089
(800) 222-1648
(413) 737-3993
Precision 1.2, $295
A 2.5-D CAD product derived from Summadraft, which has been available for years on other platforms.

• Intergraph
1 Madison Industrial Park
Huntsville, AL 35807
(800) 345-4856
(800) 345-0218 (in AL)
MicroStation Mac 3.5.1, $3,300
An extensive, multiuser, 3-D CAD system with rendering facilities, reference files, and file compatibility with versions on other platforms. Will support RenderMan interface.

• Kandu Software Corp.
2305 N. Kentucky St.
Arlington, VA 22205
(703) 532-0213
CADMOVER 3.01, $495
A utility for exchanging/converting CAD data in numerous formats.

• Klex Software, Inc.
25633 Branchaster
Farmington Hills, MI 48018
(313) 477-6800
CompuGraph 1.0v19, *3-D visualization product,* $40 (shareware)
MacConcept 3.0, $1,995; $1,495 for Claris CAD and CADMOVER owners
CompuGraph is the shareware precursor to MacConcept, a 3-D wire-frame CAD/visualization system used primarily in the automotive industry.

• Knick Drafting
1275 S. Patrick Drive, Suite P
Satellite Beach, FL 32937
(407) 777-0275
MacPerspective 4.0, $295
A 3-D wire-frame drawing package.

• LANDCADD, Inc.
7519 E. Highway 86
Franktown, CO 80116
(303) 688-8160
LANDCADD 10.0, $595 to $2,995
LANDCADD Light 1.0, $695
Modular, specialized add-ons to AutoCAD for landscape designers. LANDCADD Light is a version for site planning, landscape design, and irrigation design that is blended from the various modules and that includes a symbol library containing 350 images.

• LAPCAD Engineering
1568 Diablo Point Court
Chula Vista, CA 92011
(619) 421-1236
LapCADII 4.0, $495
A graphic 3-D CAD-like front end for MSC Finite Element Analysis-model creation. One version exists for the MSC/pal on the Mac and one for MSC/NASTRAN on the VAX, IBM, Cray, and other computers.

• Microspot
21421 Stevens Creek Blvd., Suite 240
Cupertino, CA 95014
(800) 622-7568
(408) 253-2000
MacPlot Pen Plotter Standard 3.6.2 *(A & B),* $199
MacPlot Pen Plotter Professional 3.6.2 *(page sizes A through E),* $399
MacPlot Color Thermal 3.6.2, $495
MacPlot DMA Color Thermal 2.0, $1,295
MacPlot Electrostatic 3.6.2, $995
MacPlot DMA Electrostatic 2.0, $2,495
MacInteriors 1.0, $295
MacInteriors Professional 1.0 *(color),* $595
MacPlot is a series of drivers for pen plotters, color thermal printers, and electrostatic plotters. MacInteriors is a 3-D interior-design and space-planning program.

• Planit West
1670 F Las Plumas
San Jose, CA 95133
(408) 927-0744
Planit 1.5, $3,995
A 3-D CAD system for kitchen design that operates in full color, with more than 60 major kitchen-cabinet catalogs on file.

• ModaCAD, Inc.
1954 Cotner Ave.
Los Angeles, CA 90025
(213) 312-6632
ModaCAD Design: ModaSKETCH, ModaDRAPE, $5,000 to $10,000
Textile Design: ModaWEAVE, ModaWEAVE Dobby, ModaWEAVE Jacquard, $5,000 to $10,000
Patternmaking, Grading, and Marking, $5,000 to $10,000
Data Management and ModaPLAN, $6,000
Computer-aided-design and -manufacturing systems for the sewn-product industries, specializing in fabric, textiles, garments, surface design, production, data communication, and interior and industrial design.

• Nedrud Data Systems
P.O. Box 27020
Las Vegas, NV 89126
(702) 737-7735
DragonWave 1.131, $1,380
A microwave-analysis and -design program with integrated schematic capture for creating microwave circuits.

• Northstar Engineering Design
1704 Chatham Ave.
Arden Hills, MN 55112
(612) 636-1216
Engineering Symbols Library 1.0, $49
Design and drafting library for Mac-based CAD systems and drawing programs, with more than 1,500 symbols for mechanical, chemical, and electrical engineers.

• Palomar Software
2964 Oceanside Blvd., Suite D
Oceanside, CA 92054
(619) 721-7000
PLOTTERgeist 1.0, $395
A pen-plotting program that allows background plotting from CAD and PICT files. Price includes RS-232 cable.

• Paracomp, Inc.
123 Townsend St., Suite 310
San Francisco, CA 94107
(415) 543-3848
ModelShop 1.1, $595
Swivel 3D 1.1, $495
Swivel 3D Professional 1.0, $695
ModelShop is a 3-D visualization product primarily for space planning. Swivel 3D is a 3-D visualization/rendering/animation system with extensive modeling features. The professional version supports 24-bit color and other enhancements such as DXF export to AutoCAD and RenderMan.

•San Juan Software Co.
P.O. Box 27620
Seattle, WA 98125-2620
(206) 367-4188
MacAC 1.0.4, $149.95
MacAC II 1.0, $595
MacAC is an integrated linear-circuit-simulation and schematic-capture program. MacAC II is a full SPICE professional circuit-simulation package.

• Schlumberger Technologies, CAD/CAM Division
4251 Plymouth Road
P.O. Box 986
Ann Arbor, MI 48106-0986
(800) 366-0060
(313) 995-6000
MacBRAVO! Modeller 2.0, $1,495
MacBRAVO! Detailer 2.0, $1,995
MacBRAVO! Facilities 1.0, $4,900
MacBRAVO! Electronics 1.0, $1,950
IGES *(translator)*, $495
PlanPrint Library, $495
Electronics Component Library, $1,950
MacBRAVO! is a full-featured 2-D/3-D CAD system. Modeller is a 3-D modeling system. Detailer is a 2-D drafting program that integrates with Modeller for $3,295. Facilities is an extensive 3-D facilities-management and -design system. Electronics adds CAE (computer-aided engineering) facilities to feed popular ECAD systems.

• Silicon Beach Software, Inc.
9770 Carroll Center Road, Suite J
San Diego, CA 92126
(619) 695-6956
Super 3D 2.1, $495
A 3-D viewing, rendering, and animation system.

• Softstream International
19 White Chapel Drive
Mount Laurel, NJ 08054
(800) 262-6610
(609) 866-1187
Relational Objects 1.5, $240
Formerly known as Paradigm by Acuity, this relational drawing package lets you reposition points in a drawing according to user-specified equations.

• Strata, Inc.
249 E. Tabernacle, Suite 201
St. George, UT 84770
(800) 869-6855
(801) 628-5218
StrataVision 3d, 1.4, $495
StrataFlight 1.0, $189
StrataVision Attributes Library Series: Decorative Stone and ***Wood Grain***, $139 each
StrataVision is a 3-D visualization and rendering system that can be animated with StrataFlight. Each library contains 20 attributes.

• Textco, Inc.
27 Gilson Road
West Lebanon, NH 03784
(603) 643-1471
DNA Inspector IIe 3.14, $345 plus shipping
Gene Construction Kit 1.0, $895; academic discount, $495
DNA Inspector IIe is an easy-to-use DNA-analysis program that can handle most common analyses. Gene Construction Kit is a tool for displaying and manipulating recombinant DNAs.

• Veristar, Inc.
2112 Runtland Drive
Austin, TX 78758
(512) 339-0070
MiniReporter 2.01, $129.95 plus shipping
A report generator for use with MiniCAD+ 2.0 that creates tab-delimited external text files of the symbols and their attributes in a MiniCAD+ drawing.

• Vamp, Inc.
6753 Selma Ave.
Los Angeles, CA 90028
(213) 466-5533
McCAD PCB-1 3.2 *(printed-circuit-board layout)*, $395
McCAD PCB-ST 1.1 *(professional layout editor)*, $995
McCAD Schematics 3.2 *(complete schematic-capture environment)*, $495
McCAD Schematics-DS 3.2 *(schematic capture with digital simulation)*, $895
McCAD "Classic" SPICE 2.0 *(analog simulation)*, $745
McCAD PCB-to-Gerber Translator 1.1, $175
McCAD Gerber View/Translator 1.1 *(universal CAD bridge)*, $895
McCAD Trailblazer 3.05 *(high-performance interactive auto-router)*, $4,895
McCAD Tracker 3.06 *(intermediate two-signal-layer auto-router)*, $1,095
McCAD EDS 1 *(software bundle)*, $1,495
McCAD EDS 2 *(software bundle)*, $1,895
This modular family of products for printed-circuit-board design consists of layout, schematic-capture, CAE, and auto-routing modules.

• Versacad Corp.
2124 Main St.
Huntington Beach, CA 92648
(714) 960-7720
VersaCAD/Macintosh Edition 2.2, $1,995
VersaCAD Drafter 2.2, $995
VersaCAD Architect 1.0, $295
VersaCAD Mechanical 1.0, $195
VersaCAD is a 2.5-D CAD system available on several platforms. The Mac edition is a general-purpose 2-D and 3-D CAD package with additional utilities and translation capabilities. Drafter is a low-cost version that retains all the CAD features of the full system. Architect is a module with numerous AEC facilities. Mechanical is a module that has specific features for mechanical design.

• VIDI
16309 Doublegrove
La Puente, CA 91744
(818) 918-8834
Dimensions 3DModeler 1.0, $595
Dimensions 3DProducer 1.0, $695
Dimensions RayTracer 1.0, $995
Dimensions Materials Modules, $99 each
A family of 3-D visualization, rendering, and animation products. 3DModeler is a non-polygon-based free-form modeler. 3DProducer is a 3-D photo-realistic rendering and animation application with independent light source, camera, and object animation. RayTracer uses multiple reflections and refractions in addition to pattern and image mapping.



MiniCad+™

Computer-Aided Design and Analysis comes of Age

MiniCad+ rises on the foundations of a groundbreaking Macintosh CAD program, MiniCad 2D/3D. Universal in aim, MiniCad Plus is a total design and analysis solution, the answer to time-consuming transfers between applications. This professional CAD system offers the following easy-to-use components:

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- Active spreadsheet inside drafting area which can be hot linked with objects to perform area calculations, parts schedules, cost estimation and more. As easy-to-use as the spreadsheet you're using now.
- All new integrated 3D that is so powerful and user-friendly we may change your mind about micro 3D.
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PostScript® laser printers used to be expensive, large and shared by the entire office.

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microLaser™ from Texas Instruments: the affordable PostScript printer you can call your own.

Finally, for less than $3,000, you can have a PostScript laser printer right at your desk. TI introduces its new microLaser, with the features you want – now and in the future.

Small size. Lots of value.

At only 13.4 inches wide and 14.2 inches deep, microLaser may be the small kid on the block, but it packs plenty of punch. This printer takes full advantage of the advanced software that runs on your PC. That's because it uses the Adobe® PostScript printer language and is compatible with the HP LaserJet® Series II – allowing you to switch between them easily. With that kind of flexibility, the six-page-per-minute microLaser is ideal for word processing, spreadsheet and desktop publishing applications.



Because microLaser features the PostScript language, you can print fonts in a variety of typestyles and sizes. Plus, you can print them tall-ways, long-ways, all kinds of ways. You can even print complex pages of integrated text and graphics.

Capabilities that grow as your needs grow.

One of the best things about microLaser is that you only buy what you need. So if you're not ready for PostScript language, you can buy the standard microLaser for less than $2,000 and add PostScript software and other powerful features later.

You can upgrade microLaser without tools or technicians by simply adding upgrade boards. These boards include up to four 1Mb increments of memory, serial and AppleTalk® interfaces and a PostScript interpreter. All you have to do to get additional fonts or emulations is plug optional microCartridges into two credit card-size slots.

Superior paper handling.

Part of what makes microLaser a truly personal desktop laser printer that takes up so little room is its paper drawer, which slides *inside*. Because microLaser holds *250 sheets* standard (it holds 500 when you add an optional paper drawer), you spend less time refilling paper and more time creating superb-looking documents.

New! PostScript printing just got *more* affordable – now only $2,499*

How do you enter the world of PostScript with its high-quality scalable fonts, integrated text and graphics, and broad software support? Buy TI's new microLaser PS17 – the laser printer that offers you more scalable fonts and other features, proving that great things come in small packages.

At just half the footprint of the HP LaserJet III, microLaser PS17 not only offers 17 scalable fonts (LaserJet III offers eight), they're *PostScript* fonts – the industry's standard for high quality. That means more than 4,000 software programs take advantage of microLaser's PostScript font capabilities.

Plus, microLaser PS17 offers the same superior paper handling as other microLaser models, is easily upgradeable and comes at a desktop price.

Why would you consider anything else?

Call TI at 1-800-527-3500 to find out more!

The printer also handles a variety of paper sizes and types – from letter, legal and executive to transparencies, labels and envelopes. For those times when you're facing a large mail merge task, just plug in an optional envelope feeder to easily alternate between letters and envelopes.

Your own PostScript printer is a call away.

To find out more about how you can have affordable PostScript printing right at your own desk, call TI today.

1-800-527-3500.

TEXAS INSTRUMENTS

© 1990 TI 66055

Standard microLaser is HP LaserJet II-compatible, prints six pages per minute and comes with .5 Mb of RAM. microLaser PS17 and PS35 have the same features as the standard microLaser, plus an Adobe PostScript interpreter with 17 or 35 typefaces and an extra 1 Mb of RAM. microLaser is a trademark of Texas Instruments Incorporated. Adobe and PostScript are registered trademarks of Adobe Systems, Inc. LaserJet is a registered trademark of Hewlett-Packard, Inc. AppleTalk and Macintosh are registered trademarks of Apple Computer, Inc. *TI suggested list price for microLaser model PS17.

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How does AE's 3.5 drive stack up?



Quite well

Introducing Applied Engineering's new 3.5 drive. We'll stack this drive up against Apple's any day. Because we designed in all the reliability and performance of the Apple drive at a price more like that of the cheap imports.

We also added performance features like an inexpensive, user-upgrade path from the 800K base model to 1.44 MEG FDHD (MS-DOS compatible) SuperDrive capacity. And an exclusive 2-way LED indicator that displays green for reading, red for writing. The AE 3.5 drive also incorporates the same, top-quality SONY mechanism used in Apple's drive.

1.44 MEG capacity means you can stop playing diskette roulette. Simply store your large 2-disk application programs on one, high density disk and forget about fumbling for "sets" of disks. And storing files just became twice as easy too, because you'll only need half the number of disks.

Aesthetically, the AE Drive is every bit as handsome as the Apple drive. We designed a thick, high-impact ABS case to stack with, daisy-chain with, and exactly match the footprint of Apple's drive.

Other features include: auto eject, complete daisy-chain capacity (from AE to another drive or vice versa), FDHD SuperDrive compatibility, MS-DOS compatibility, Apple II compatibility, a full one-year warranty.

Compare the two drives. Consider the difference between Apple's suggested retail prices of $429 for 800K and $629 for FDHD SuperDrive versus our $279. You'll see that our upgradeable drive stacks up quite well.

Other fine Macintosh peripherals from AE include the DataLink series of modems. *DataLink/Mac™* is a 2400 baud internal for Mac IIs featuring an upgrade path for the addition of send-fax and MNP-5. $299. *DataLink Express™* is our 2400 baud external with the same upgrade capabilities. $249. *DataLink/Mac Portable™* is a 2400 baud internal modem complete with send-fax and MNP-5 in a design that helps save the Portable's battery life. $299. *MacRam Portable™* is an internal memory expansion card for the Mac Portable that boosts available RAM from 1 to 8 MEGs. Call for current prices.

AE 3.5 Drive™ (800K base model).....$279.

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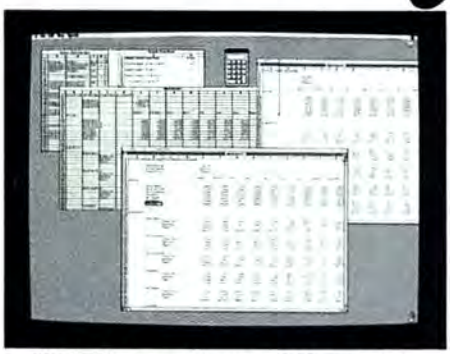
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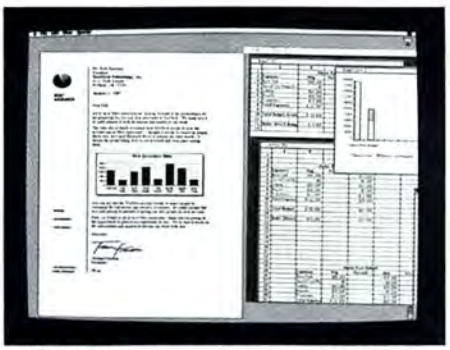
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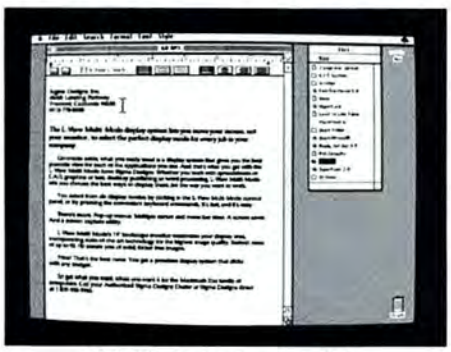
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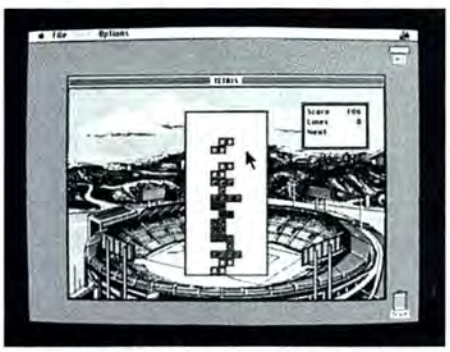
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MiniFinders

Welcome to MiniFinders, your personal buyer's guide. *MacUser* editors carefully select and evaluate each product, assigning ratings from one to five mice, in half-mouse increments. All of the ratings are relative within a category, and because the market is constantly changing, our ratings change too, reflecting the most current conditions. We've indicated all our Eddy (Editors' Choice) Award winners with a ★, along with the year in which they were recognized for their excellence.

MiniFinder Index

Communications 3
Databases 5
Desktop Publishing 6
Education 8
Entertainment 9
Financial Management 12
Freeware & Shareware 15
Graphics & Design 15
Hardware & Accessories 21
Hypermedia 28
Multimedia 32
Music 32
Number Crunching 36
Organizational Tools 40
Programming 44
Utilities 46
Video 58
Word Processing 58

Communications

pcMACTERM/pcANYWHERE III ♜♜♜♜

pcMACTERM/pcANYWHERE III are two programs that work together to take control of an MS-DOS machine from the Mac keyboard. Allows DOS files to be printed through the Mac. pcMACTERM II, version1.2; pcANYWHERE III, version 3.11a. Requires Mac 512K or later, System 4.1 or later, 128K IBM PC-compatible, and MS-DOS 2.1 or later. pcM 5. Dynamic Microprocessor Associates, 1776 E. Jericho Turnpike, Huntington, NY 11743. (516) 462-0440. (Jan '89)

• Connectivity

Apple PC 5.25 ♜♜♜½

Apple PC 5.25 is a drive that connects to the Mac and reads 5.25-inch DOS floppy disks. Unlike most Mac drives, it doesn't appear on the desktop. Access to DOS files is through Apple File Exchange. Requires Mac SE or NuBus slot and a board that occupies an expansion slot in your Mac. Drive, $399; board, $129. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (Oct '89)

DaynaFile ♜♜♜♜♜

DaynaFile is a drive that reads 3.5- or 5.25-inch DOS floppy disks. The drive connects to a Mac SCSI port and appears on the desktop. Version 3.1 (drive), version 2.3 (INIT). Requires System 3.2 or later. DF0104 Dual 3.5-/5.25-inch, $1,005; single drives start at $650; MacLinkPlus/Dayna, $125; DOS Mounter (for use with Apple FDHD drives), $89. Dayna Communications, 50 S. Main St., Fifth Floor, Salt Lake City, UT 84144. (801) 531-0600. (Oct '89) ★'87 Eddy

LapLink Mac III ♜♜♜♜½

LapLink Mac III isn't just for Mac-to-DOS anymore; it's also a Mac-to-Mac program with a full Mac interface and a special cable capable of 750-Kbps transfers between Macs. (By comparison, AppleTalk speed is only 230 Kbits per second.) LapLink Mac III is all new and comes with an INIT that gives you background access to your Mac's files even when LapLink isn't running (similar to Timbuktu/Remote's file-transfer functions). LapLink Mac III deserves a second look. Version 3.0. $189.95. Traveling Software, 18702 North Creek Parkway, Bothell, WA 98011. (800) 662-2652. (Sept '90)

MacLinkPlus/PC ♜♜♜♜♜

MacLinkPlus/PC offers more translations between more PC and Mac applications than does any other application. Its interface is friendly, and translations are clean. In addition to translating locally or over a network, the package can connect to a PC serially and via modem. Translators also work with Apple File Exchange. Version 4.1. MacLinkPlus/PC (with telecommunications), $199; MacLinkPlus/Translators (desktop version only), $159; MacLinkPlus/WangVS and MacLinkPlus/WangOIS, $395 to $895. DataViz, 35 Corporate Drive, Trumbull, CT 06611. (203) 268-0030. (Oct '89)

MacWorkStation ♜♜♜♜

MacWorkStation is a development environment and communications program that can access custom mainframe applications through the Mac interface. Modular design allows for expandability. Mac II and MultiFinder friendly. Version 3.0. Single-use license, $100; internal-use license, $2,500; commercial-use license, $5,000. Apple Software Licensing, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (Oct '88)

Oracle for Macintosh ♜♜♜♜

Oracle for Macintosh is more a development tool kit than an end-user product. It allows the creation of Mac front-end applications that access Oracle databases on mainframes and minis. Includes HyperCard XCMDs. Version 1.1. Single-user, $299; network version, $999. Oracle, 20 Davis Drive, Belmont, CA 94002. (800) 345-3267 or (415) 637-0800. (June '89)

QuickShare 2.0 ♜♜♜½

QuickShare 2.0 connects your Mac to a PC via SCSI, enabling a Mac to access files on a PC or PC network. Also gives the Mac disk space on PCs, which can be mounted on the Mac's desktop and used as Mac disks. File-transfer software provides generic text and graphic translations. Requires DOS 3.0 or later. $465. Compatible Systems, P.O. Drawer 17220, 2900 Center Green Court S., Boulder, CO 80308. (303) 444-9532. (Oct '89)

Rapport/Drive 2.4 ♜♜♜♜½

Rapport/Drive 2.4 is a connector/drive combination. When the Rapport connector is attached to the external disk-drive port of a Mac Plus or SE, it allows MS-DOS 3.5-inch disks to be inserted into the Mac's internal drive and read through Apple File Exchange. Drive 2.4 is a 2.4-megabyte external drive that can be used with Rapport. Rapport, $295; Drive 2.4, $495. Kennect Technology, 120A Albright Way, Los Gatos, CA 95030. (800) 552-1232, (408) 370-2866. (July '89)

SoftPC ♜♜♜½

SoftPC puts an IBM PC XT inside your Mac without making you crack the case to add any special coprocessor boards. The emulation of an MS-DOS machine is done entirely in the software. Version 1.3. Requires Mac II or SE equipped with 68020 accelerator card and 2 megabytes of RAM. $399. Insignia Solutions, 254 San Geronimo Way, Sunnyvale, CA 94086. (408) 522-7600. (Nov '88)

VersaTerm-PRO ♜♜♜♜½

VersaTerm-PRO is a very powerful terminal program with several special features. Does one of the best VT100 emulations available and specializes in high-quality Tektronix 4014 and 4105 emulation. A pro's tool. Version 4.0. Requires Mac 512K or later. $295. Synergy Software, 2457 Perkiomen Ave., Reading, PA 19606. (215) 779-0522. (Apr '87)

Mice Ratings ..... ♜ ..... ♜½ ..... ♜♜ ..... ♜♜½ ..... ♜♜♜ ..... ♜♜♜½ ..... ♜♜♜♜ ..... ♜♜♜♜½ ..... ♜♜♜♜♜

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3 1/2" Floppy Disk Drive..... $339.00



DPI 1.2/360

5 1/4" SCSI Floppy Drive allows Mac™ to read and write1.2MB or 360K DOS Floppy Diskettes.

5 1/4" MS/DOS Compatible $399.00

*All prices and specifications are subject to change without notice.

BMUG (Berkeley Macintosh User Group) Newsletters Choice Product section says... "It's fast, reliable and trouble-free; the best of all Syquest removable drives available". (Winter/Spring 89) DPI has been listed in this category for the last three bi-yearly issues.

We offer these four drives as well as our hard drive line 20MB to 600MB with IBM, Amiga, and Atari compatible software.

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DPI

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MiniFinders

• Networking

AppleShare ⚡⚡⚡⚡

AppleShare is Apple's own file server. Software-based AppleShare lets network users protect files from other users on the folder level. Version 2.01. Requires a dedicated Mac and a hard-disk drive. $799; AppleShare Print Server, version 2.0, $299; AppleShare PC, version 2.0, $149. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (May '87)

PhoneNET ⚡⚡⚡⚡⚡

PhoneNET is an AppleTalk-compatible network. Network can be up to 3,000 feet in length. Unused preinstalled phone cabling can be used for network and can be combined with AppleTalk on the same network. $75 per node. Farallon Computing, 2000 Powell St., Suite 600, Emeryville, CA 94608. (415) 596-9100. (Dec '86) ★'87 Eddy

TOPS ⚡⚡⚡⚡½

TOPS is a file server designed to network computers with different operating systems. Supports Macs, MS-DOS compatibles, and UNIX machines. Access to files and subdirectories is transparent to users; they appear as Mac folders. Handles only ASCII or text files. Serialized. Version 3.0. $249. TOPS, 950 Marina Village Parkway, Alameda, CA 94501. (800) 445-8677. (May '87) ★'87 Eddy

• Telecommunications

Accu-Weather Forecaster ⚡⚡⚡⚡

Accu-Weather Forecaster is a combination communications and meteorological data-analysis program. Gives access to hourly National Weather Service reports. Simple maps and charts let you view weather data graphically. Telecommunication mode is optimized to reduce connect-time costs. Version 1.05. Requires Mac Plus or later and a 300-, 1,200- or 2,400-bps Hayes-compatible modem. $89.95; Accu-Weather connect fee, $39.95; educational and commercial connect rates higher. Metacomet Software, P.O. Box 31337, Hartford, CT 06103. (203) 223-5911. (Aug '89)

Desktop Express ⚡⚡⚡½

Desktop Express is a simple-to-use, semiautomated program for using MCI Mail and Dow Jones News/Retrieval. Performance is compromised for ease of use. Requires Mac 512K or later. $149. Dow Jones & Co., P.O. Box 300, Princeton, NJ 08543-0300. (609) 520-4641. (Jan '88)

FAXstf ⚡⚡⚡

FAXstf is an early entrant in the fax-modem race. Adequate but slower than most fax machines, and using it as a normal modem requires changing plugs. Version 3.0. Requires 1 megabyte of memory and a hard-disk drive. $445. STF Technologies, Inc., P.O. Box 81, Concordia, MO 64020. (800) 426-1679. (Feb '89)

HyperDialer ⚡⚡⚡½

HyperDialer provides an interface between a phone and your Mac so you can dial a number using a Rolodex-type program such as SideKick, Focal Point, or QuickDEX. Connects between the Mac's sound port and a telephone handset. Requires Mac with 128K. $39.95. DataDesk International, 7651 Haskell Ave., Van Nuys, CA 91406. (818) 780-1674. (Sept '88)

inBox ⚡⚡⚡⚡

inBox is an easy-to-use mail system with a very slick interface. Dedicated Mac not required. Starter set includes one Administrator disk and three Connection disks. $249; additional Mac personal connections, $69 each; additional DOS personal connections, $99 each. TOPS, 950 Marina Village Parkway, Alameda, CA 94501. (800) 445-8677. (May '87) ★'86 Eddy

Liaison ⚡⚡⚡⚡⚡

Liaison is a software-based AppleTalk bridge for connecting two LocalTalk networks or a LocalTalk and an EtherTalk network. Using Liaison with standard modems, users can connect remotely to an AppleTalk network, or two networks can be connected to form a wide-area network. Serialized. Version 2.06. $295. Infosphere, 4730 S.W. Macadam Ave., Portland, OR 97201. (800) 445-7085 or (503) 226-3515. (April '89) ★'88 Eddy

MicroPhone II ⚡⚡⚡⚡½

MicroPhone II is the leader of the high-end telecommunication programs, with more options and features than its competition. Virtually all protocols and modems are supported. Complexity and a very busy interface are drawbacks. Version 3.0. Requires Mac Plus or later. $295. Software Ventures, 2907 Claremont Ave., Berkeley, CA 94705. (415) 644-3232. (June '90) ★'86 Eddy

NetWare for Macintosh ⚡⚡⚡

NetWare for Macintosh allows Macintoshes on LocalTalk or Ethernet networks to connect to a NetWare file server, using AppleShare client software. Difficult PC-based setup and administration. This is not recommended for Mac-only networks. For users with non-AppleTalk PC networks already attached to NetWare servers: 4 mice. Version 1.1. Requires 80286- or 80386-based PC for server, PC for administration, PC LocalTalk card, two PC Ethernet cards, NetWare version 3.15 or later, and AppleShare client software. $200. Novell, 122 E. 1700 S., Provo, UT 84606. (800) 526-5463. (Sept '89) ★'88 Eddy

Phone Line Manager 103 ⚡⚡⚡⚡⚡

Phone Line Manager 103 lets you connect a phone, fax, and modem to the same phone line. It's intelligent enough to route incoming calls correctly. Outside callers can be given codes to override it, which saves time. No software needed. Requires any Mac. $199.95. La Cie Ltd., 16285 S.W. 85th, Suite 306, Tigard, OR 97224. (800) 999-0143 or (503) 684-0143. (Mar '90)

Portable Pack ⚡⚡⚡⚡

Portable Pack is a tool kit for remote communication. It includes a customized Swiss army knife for clipping and crimping wires, two PhoneNET StarConnectors, two RJ-11 modular phone cables, two modular cable extenders, two modular Y-splitters, a screwdriver, alligator clips, a PhoneNET-to-LocalTalk adapter cable, and even a 3-to-1 power strip, all in a handy carrying case, plus Timbuktu and Timbuktu/Remote. The price is steep, especially if you already have the Timbuktu products. $495. Farallon Computing, 2000 Powell St., Suite 600, Emeryville, CA 94608. (415) 596-9000. (Sept '90)

Remote Access Pack ⚡⚡½

Remote Access Pack is a bundle of Farallon communications products for remote communication. The package includes a V.32 9,600-bps modem, a WakeUp cable with Auto ShutDown software, Timbuktu, and Timbuktu-Remote. You need two Remote Access Packs to communicate. The modem is a V.32 full-duplex unit and is very sensitive to line quality. Because the modem is the weak link, consider buying Timbuktu, Timbuktu/Remote, and the WakeUp cable separately, and provide your own modems. Version 2.0.5. $1,295. Farallon Computing, 2000 Powell St., Suite 600, Emeryville, CA 94608. (415) 596-9000. (Sept '90)

Remote/WakeUp ⚡⚡⚡⚡½

Remote/WakeUp is a slick hardware/software solution that lets you turn an ADB-capable Mac on from any modem and also lets you shut down the Mac after a specified period of inactivity. Uses a special modem cable that plugs into the modem serial port and an ADB port. Auto ShutDown is an INIT. Software version 1.0. $49.95. Farallon Computing, 2000 Powell St., Suite 600, Emeryville, CA 94608-9905. (415) 591-9100. (Aug '90)

Smartcom II ⚡⚡⚡⚡⚡

Smartcom II balances power and ease of use. It's capable of unattended operation and has a powerful command language. The fastest screen updating available can keep up even at 9,600 bps. The large-screen buffer can easily be archived. Version 3.1C. $149. Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348. (404) 441-1617. (Jan '89) ★'85 Eddy

V-series Smartmodem 9600 ⚡⚡⚡⚡½

V-series Smartmodem 9600 is one of the fastest modems for the Mac. To achieve high speeds, you need a special cable and software that supports the format. Requires Mac 512KE or later, Mac-to-modem cable, and communications software. $999. (V.42 and X.25 available.) Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348. (404) 441-1617. (Jan '89)

White Knight ⚡⚡⚡⚡½

White Knight is the new name for Red Ryder. Although the program is more powerful, the interface has taken a step backward in this complete rewrite. The manual is new and much improved. Extensions, called RCMDs (similar to HyperCard XCMDs), are now supported. You get a lot for a low price. Version 11.02. Requires Mac Plus or later. $139. FreeSoft Co., 150 Hickory Drive, Beaver Falls, PA 15010. (412) 846-2700. (May '90)



Databases

DAtabase ⚡⚡⚡⚡½

DAtabase is a flat-file manager in a DA. Handles pictures, text, and numbers. Imports QuickDEX and other files. Version 1.5. Requires Mac 512K or later. $129.95. Preferred Publishers, 5100 Poplar Ave., Suite 706, Memphis, TN 38137. (800) 423-0276 or (901) 683-3383. (Jan '90)

dBASE Mac ⚡⚡⚡

dBASE Mac is a relational database-management system that includes a structured programming language to develop stand-alone applications. Palette icons as alternatives to menu commands can help novice users. Version 1.01. Requires Mac Plus or later. $495. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90509-9972. (213) 329-0086. (Feb '88)

Double Helix II ⚡⚡⚡⚡

Double Helix II is a relational database that can work in a multiuser environment. Uses an icon-based development system for easy creation of databases. Version 3.0. $595. Odesta Corp., 4084 Commercial Ave., Northbrook, IL

60062. (800) 323-5423. (Apr '88)

Microsoft File ‡‡‡

Microsoft File is a basic flat-file manager. Has 100 forms templates that work with standard preprinted business forms. Version 2.0. Requires Mac 512KE or later. $195. Microsoft Corp., One Microsoft Way, Redmond, WA 98052-6399. (800) 426-9400 or (206) 882-8080. (Nov '89)

FileMaker II ‡‡‡‡½

FileMaker II is a solid flat-file-database manager with multiuser capability that is ideal for businesses. Has flexible layouts and good searching, data entry, and reporting capabilities. Version 1.1. Requires Mac Plus or later and two 800K drives or a hard-disk drive. $299. Claris Corp., 5201 Patrick Henry Drive, Santa Clara, CA 95052. (408) 987-7000. (Nov '89)

Filevision IV ‡‡‡

Filevision IV is a picture-oriented flat-file manager. Still the application of choice for graphics/text integration projects. Doesn't stack up well in straight-text uses. Version 1.0.6. Requires Mac Plus or later. $495. Marvelin, 3420 Ocean Park Blvd., Suite 3020, Santa Monica, CA 90405. (213) 450-6813. (Nov '89)

4th Dimension ‡‡‡‡‡

4th Dimension is a versatile relational database that can create stand-alone applications. Has a Pascal-like procedural language. Design and layout environments allow easy information linking. New version is faster and more robust. Version 2.0.10. Requires Mac Plus or later. $695. ACIUS, 10351 Bubb Road, Cupertino, CA 95014. (408) 252-4444, ext. 5. (Feb '90) ★ '87, '89 Eddy

FoxBASE+/Mac ‡‡‡‡½

FoxBASE+/Mac is a relational database that can read unmodified dBASE III PLUS applications. Amazingly fast. Good implementation of dBASE on the Mac. Version 2.0. Requires Mac Plus or later. $495; multiuser version, $695. Fox Software, 134 W. South Boundary, Perrysburg, OH 43551. (419) 874-0162. (Sept '88) ★'88 Eddy

MBA Clients ‡‡‡‡

MBA Clients is a set of 11 multiuser business applications that run under ACIUS' 4th Dimension. It's also an automated programming environment for developing additional 4th Dimension applications. Version 2.0.2. Requires Mac Plus or later and 4th Dimension. $189 per application, unlimited users. Generation Four, 10701 Lomas Blvd. N.E., Suite 110, Albuquerque, NM 87123. (505) 294-3210. (May '89)

Omnis 5 ‡‡‡‡½

Omnis 5 is Blyth's major upgrade of Omnis 3. Primarily a developer's tool, it's a powerful graphics-oriented multiuser relational/hierarchical database. Improved interface still isn't entirely Mac-like. Comes with HyperCard externals for creating HyperCard front ends. Version 1.1. Requires Mac Plus or later and hard-disk drive. $695. Blyth Software, 1065 E. Hillsdale, #300, Foster City, CA 94404. (800) 223-8050. (Sept '89)

Panorama ‡‡‡‡½

Panorama is a very powerful and classy flat-file manager. Keeps databases in RAM for speed. Spreadsheetlike data entry. Supports text, numbers, graphics, and dates as data types. Also offers powerful charting function and macros. Version 1.5. Requires Mac Plus or later. $395. ProVUE Development, 15180 Transistor Lane, Huntington Beach, CA 92649. (714) 892-8199. (Nov '89) ★'88 Eddy

RecordHolderPlus ‡‡‡

RecordHolderPlus is a middle-of-the-road flat-file manager with above-average functionality. Has the best edit functions on the market. Good choice for a high-volume application where editing can make all the difference. Version 3.1. Requires Mac 512K or later. $99.95. Software Discoveries, 137 Krawski Drive, South Windsor, CT 06074. (203) 872-1024. (Nov '89)

Reflex Plus: The Database Manager ‡‡‡‡

Reflex Plus: The Database Manager is a relational database with "smart" entry and report design but no overall programming facility. Simple to set up yet fast. Limited graphics capabilities. Version 1.01. $279. Borland International, 1800 Green Hills Road, Scotts Valley, CA 95066. (800) 345-2888 or (408) 438-5300 (tech support). (Feb '88)

Retriever ‡‡‡

Retriever is a spreadsheet-oriented DA flat-file manager that has solid reporting and uses icons instead of menus for many functions. Has fast sorting capability, decent searching capability, and HyperCard-like interface. Version 1.03. Requires Mac 512K or later. $89.95. Exodus Software, 8620 Winton Road, Suite 304, Cincinnati, OH 45231. (513) 522-0011. (Nov '89)

DESKTOP PUBLISHING

DTP Advisor ‡‡‡

DTP Advisor combines a HyperCard-based tutorial on publishing with a project-management system. Beautifully designed but better as a book. Version 1.1. Requires 1 megabyte and HyperCard 1.2. $79.95. Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101. (415) 492-3200. (Apr '89)

• FONTS AND TYPOGRAPHY

Adobe Type Manager ‡‡‡‡

Adobe Type Manager makes your fonts better almost magically. It creates smooth screen-font images of any size and improves output of most QuickDraw printers. Not quite perfect (there are some problems with Word and smaller point sizes) and slow on 68000 Macs, but improvement in quality is usually worth the effort. Version 1.2. Requires Mac Plus or later. $99 (includes Times, Helvetica, Courier, and Symbol fonts); other fonts additional. Adobe Systems, 1585 Charleston Road, P.O. Box 7900, Mountain View, CA 94039-7900. (800) 447-3577. (Feb '90) ★'89 Eddy

The Art Importer ‡‡‡‡½

The Art Importer creates PostScript fonts containing up to 256 graphic characters. Accepts logos, clip art, and PICT and EPSF graphics. As fonts, graphics can be used in programs that don't normally accept them, and resizing is as easy as changing the point size. Supports any color art. Mathcoprocessor version available. Version 2.0. Requires Mac Plus or later. $179. Altsys Corp., 720 Ave. F, Suite 109, Plano, TX 75074. (214) 424-4888. (Apr '90)

Expressionist ‡‡‡‡‡

Expressionist is a powerful DA that lets you create complex mathematical equations within applications. Equation manipulation has never been easier. Version 2.03. $129.95. Prescience, 814 Castro St., San Francisco, CA 94114. (415) 282-5864. (July '87)

FONTastic Plus ‡‡‡‡½

FONTastic Plus lets you customize and create bit-mapped fonts. It's easy to add or modify characters. Version 2.01 edits larger fonts and supports NFNTs. Version 2.02. Requires Mac 512K. $99.95. Altsys Corp., 720 Ave. F, Suite 109, Plano, TX 75074. (214) 424-4888. (May '89)

Fontographer 3.0 ‡‡‡‡

Fontographer 3.0 is an upgrade of the top PostScript-font editor/generator. New features include an integrated screen-font editor, auto-tracing, and a pen tool. This is a professional tool that also includes PostScript "hints" within your fonts. Screen-font editor automatically generates bit-mapped fonts but is strictly bare bones. Can also be used for creating logos but needs better drawing tools for this purpose. Version 3.0. Requires Mac Plus or later and System 4.2 or later. $495. Altsys, 720 Ave. F, Suite 109, Plano, TX 75074. (214) 424-4888. (Jan '90)

FontLiner ‡‡‡‡

FontLiner converts Fontographer-created typefaces into PostScript outline fonts that can be edited in Illustrator and FreeHand. Version 1.0. Requires Mac with 1 megabyte. $129.95. Taylored Graphics, P.O. Box 1900, Freedom, CA 95019. (408) 761-2481. (July '89)

FontSizer ‡‡‡‡½

FontSizer creates high-quality screen fonts of any downloadable PostScript typeface in sizes up to 96 points. Excellent utility for producing large font sizes with true WYSIWYG. Version 2.0. Requires Mac Plus or later, PostScript printer, and PostScript fonts (which can be in printer). $129.95. Specialty Software Development, 110 Wild Basin Road, Suite 270, Austin, TX 78746. (512) 327-8608. (Apr '89)

Formulator ‡‡‡‡½

Formulator is a powerful and easy-to-use formula-setting application. Can output in TeX as well as "regular" format. Version 1.1. Requires Macintosh 512K or later and runs only with U.S. system software. (International version available from Icon Technologies, Leicester, England.) $99.95. ICOM Simulations, Inc., 648 S. Wheeling Road, Wheeling, IL 60090. (708) 520-4440. (Oct '89)

Hermes & Tribune Fonts ‡‡‡‡½

Hermes & Tribune Fonts are specially designed fonts that come in sizes up to 120 points. Optimized for the ImageWriter LQ, the LaserWriter IISC, and fax modems. These fonts look better than Apple's fonts and can replace Helvetica and Times. $49.95. Miles & Miles, 704 N. Water, #1, Ellensburg, WA 98926. (509) 925-5280. (Sept '89)

KernEdit ‡‡‡‡

KernEdit is a basic kerning program with a rather un-Mac-like interface. Word View is a nice feature that greatly simplifies kerning-table creation. The maximum resolution possible is 1/1000 em. There are 17 kerning-table packages, each containing 25 tables. Version 1.06. Requires Mac Plus or later. $149; additional kerning tables, $95 per package. Pairs Software, 160 Vanderhoof Ave., Suite 201, Toronto, Ontario M4G 4B8, Canada. (416) 467-8784. (Apr '90)

KeyCap Fonts ‡‡‡‡

KeyCap Fonts contains three typefaces designed specifically for writing computer documentation. Version 1.0. $149.95.

Paperback Software International, 2830 Ninth St., Berkeley, CA 94710. (415) 644-2116. (June '89)

LetraStudio ⚡⚡⚡⚡

LetraStudio is a type-customization program for creating headlines, logos, signs, and other display type. Predefined envelopes let you create unique distortion effects. Works only with LetraFonts, which are accessible only through the program. Version 1.5. Requires Mac Plus or later and hard-disk drive. $495; $75 per font. Letraset USA, 40 Eisenhower Drive, Paramus, NJ 07653. (201) 845-6100. (May '89) ★'88 Eddy

LetrTuck ⚡⚡⚡½

LetrTuck lets you add, delete, or modify the kern pairs for any installed font. Version 2.2. Requires Mac 512KE or later. $50. EDCO Services, 12410 N. Dale Mabry Highway, Tampa, FL 33618. (800) 523-8973. (June '89)

Letterforms & Illusion ⚡⚡⚡⚡

Letterforms & Illusion is a set of fonts and figures designed by Scott Kim that leads you into exciting typographic explorations. Includes a limited version of MacPaint. Requires Mac Plus or later. $39.95. W.H. Freeman & Co., 41 Madison Ave., New York, NY 10010. (212) 576-9400. (Mar '90)

MacTeX ⚡⚡⚡½

MacTeX is the TeX environment of choice for hard-core Mac TeX users — very intimidating for others. Painfully slow and visually unattractive. Version 2.0. Requires Mac Plus or later. $750. FTL Systems, 234 Eglington Ave. E., Toronto, Ontario M4P 1K5, Canada. (416) 487-2142. (Apr '88)

PostScript Type Sampler and Type Listing ⚡⚡⚡⚡

The PostScript Type Sampler and Type Listing is a classic art-director's type book with samples of all the available laser fonts. The material is also available and searchable on-disk, but screen-resolution considerations make the printed version the more valuable part of this package. Type Listing requires Microsoft Works (the text file is also provided). Type Sampler is in notebook form. Type Listing, $200 (includes 3 to 4 updates); Type Sampler, $75; one year of printed updates, $80; Sampler, one year's update service, and Listings, $255. MacTography, 326-D N. Stonestreet Ave., Rockville, MD 20850. (301) 424-3942. (Apr '90)

Publishing Packs ⚡⚡⚡½

Publishing Packs bundles three Adobe typefaces that work well together for particular publishing projects. The packages offer substantial savings over purchasing the typefaces individually, and the documentation has useful information on typeface characteristics. Newsletters, $395; Forms and Schedules, $475; Presentations, $475. Adobe Systems, Inc., 1585 Charleston Road, P.O. Box 7900, Mountain View, CA 94039-7900. (800) 344-8335. (Feb '89)

Textures ⚡⚡⚡

Textures is an implementation of TeX, the big daddy of typesetting programs. Good for people trained on mainframes in the early days. Otherwise very sticky, with a high learning curve. Version 1.2. Requires Mac Plus. $495; education, $395. Blue Sky Research, 534 S.W. Third Ave., Portland, OR 97204. (800) 622-8398. (Apr '88)

TypeAlign ⚡⚡⚡⚡½

TypeAlign is an INIT/DA combination utility that is essential for DTP work if you use ATM. It lets you place text along circular, angled, or arbitrary paths. The program could use the Clipboard better, but the main drawback is that it has limited effects. Version 1.0.2. Requires Mac Plus or later. $99.95. Adobe Systems, 1890 Shoreline Blvd., Mountain View, CA 94043. (415) 324-8080. (May '90) ★ '89 Eddy

TypeStyler ⚡⚡⚡⚡

TypeStyler is a utility application that lets you distort regular type to create display type. It supports 8-bit color and can output files as process-color separations. Its performance is excellent except on low-end Macs, where it might be unacceptably slow. Includes 10 fonts. Version 1.0. Requires Mac Plus or later. $199.95. Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101. (800) 521-6263. (May '90)

UltraSpec ⚡⚡½

UltraSpec performs copy-fitting chores such as calculating copy length, creating dummy pages, and producing printer specs. Version 1.0. Requires Mac Plus or later and HyperCard. $149.95. SoftStream, 19 White Chapel Drive, Mount Laurel, NJ 08054. (800) 262-6610. (June '89)

World Class Fonts! ⚡⚡⚡⚡½

World Class Fonts! comes in volumes that include three useful utilities as well as all the Mac the Knife fonts and a lot more. Volumes 1 – 8 are now available. $79.95 per double volume. Dubl-Click Software, Inc., 9316 Deering Ave., Chatsworth, CA 91311. (818) 700-9525. (Dec '86)

World Class Laser Type ⚡⚡⚡⚡

World Class Laser Type is a six-volume collection of PostScript fonts that are a good alternative to more-expensive fonts. Each volume comes on two 800K disks and includes screen fonts and PostScript-printer fonts. An excellent value. Requires PostScript printer. $79.95 per volume. Dubl-Click Software, Inc., 9316 Deering Ave., Chatsworth, CA 91311. (818) 700-9525. (Dec '89)

• PAGE LAYOUT

Design Studio ⚡⚡⚡½

Design Studio is based on Ready,Set,Go! but is more than just a beefed-up version of that program. It has new layout-management features, and its handling of text, graphics, and color is welcome. It shows many of RSG's drawbacks, however. Performance needs to be improved considerably, and a totally new manual would be very helpful. Version 1.0. Requires Mac II or later. $795. Letraset, 40 Eisenhower Drive, Paramus, NJ 07953. (800) 634-3463. (June '90)

Fast Forms ⚡⚡⚡

Fast Forms is a forms-design and -management program that uses a DA for forms fill-out. It has only basic calculation ability and a limited design environment. Confusing interface. Version 1.2.1. Requires Mac 512KE, System 3.2, and Finder 5.3. $149.95. Power Up Software Corp., 2929 Campus Drive, San Mateo, CA 94403. (415) 345-5900. (Jan '90)

FlexForm Business Templates ⚡⚡⚡⚡½

FlexForm Business Templates are two volumes of prepackaged business forms. Includes SmartForm Assistant. Volume I contains stockkeeping, production, sales, billing, and collection; Volume II has purchasing, receiving, accounting, disbursing, and personnel. $89.95 per volume. Antic Software, 544 Second St., San Francisco, CA 94107. (415) 957-0886. (Jan '90)

FormSet: Business Forms Edition ⚡⚡⚡

FormSet: Business Forms Edition provides a wealth of business forms, such as expense reports and profit/loss statements. Fields are automatically calculated. Can't be customized beyond adding a logo. Version 1.4. Requires Mac 512KE or later. $95. SoftView, 4820 Adhor Lane, Suite F, Camarillo, CA 93010. (805) 385-5000. (Jan '89)

Interleaf Publisher ⚡⚡⚡½

Interleaf Publisher is a speedy multiuser layout system for producing large, complicated documents. This version has an improved user interface, but it still suffers from poor font management. Version 3.5. Requires Mac II with 5 megabytes of RAM and a hard-disk drive. $995. Interleaf, 10 Canal Park, Cambridge, MA 02141. (617) 621-0800. (Apr '89)

Layouts ⚡⚡⚡⚡½

Layouts is a five-disk set of PageMaker templates. The business-document templates are excellent. The superb manual has money-saving printing tips. Versions for QuarkXPress and Ready,Set,Go! are also available. Requires Mac Plus or later. $179. Starburst Designs, 1973 N. Nellis Blvd., Suite 315, Las Vegas, NV 89115. (702) 453-3371. (May '90)

Multi-Ad Creator ⚡⚡⚡⚡½

Multi-Ad Creator is a powerful tool that lets you create high-quality single-page ads. It is easy to use and is nearly foolproof (it doesn't have a good-taste feature, however.) Virtually every kind of graphic and most word-processor files can be imported. If you create ads, get it. Version 2.1. Requires Mac Plus or later. $995. Multi-Ad Services, 1720 W. Detweiller Drive, Peoria, IL 61615. (309) 692-1530. (June '90)

Page Designs Quick! (PDQ!) ⚡⚡⚡⚡½

Page Designs Quick! (PDQ!) and Page Designs Quick! 5 (PDQ! 5) are PageMaker templates aimed exclusively at newspaper publishing. The two sets contain many templates: 60 three-column, 60 four-column, and 225 tabloid-sized five-column layouts. The quality is excellent, but the templates are bare bones, with no art. You can modify all layouts from within PageMaker. PDQ!, $89.95; PDQ! 5, $159.95. PAR Publishing, 6355 Topanga Canyon Blvd., Suite 307, Woodland Hills, CA 91367. (818) 340-8165. (Aug. '90)

PageMaker ⚡⚡⚡⚡⚡

PageMaker gives designers complete freedom over page layout. Uses pasteboard metaphor. All placement of text and graphics relies on hand-eye coordination. Color Extension add-on lets you edit a color image's CMYK values. Can't do four-color separations. Easy to learn. Version 3.02. Requires Mac Plus or later and a hard-disk drive. $595; Color Extension available. Aldus, 411 First Ave. S., Seattle, WA 98104-2871. (206) 622-5500. (Jan '90). ★'85, '87, '88 Eddy

PageMaker Portfolio: Designs for Newsletters ⚡⚡⚡⚡

PageMaker Portfolio: Designs for Newsletters provides 21 newsletter templates with preset columns, headlines, graphics, and captions. Documentation provides excellent tutorial in page design. Versions for Manuals and Business Communications also available. Requires Mac Plus or later and PageMaker. $99 each. Aldus,

411 First Ave. S., Seattle, WA 98104-2871. (206) 622-5500. (May '87)

Publish It! ⚡⚡⚡⚡

Publish It! is a moderately priced page-layout package designed for users with Pluses and SEs. Includes word-processing and simple drawing and painting tools. Works using a frame metaphor. Can rotate text. Limited color support. Version 1.1. Requires Mac 512KE or later and System 4.2 or later; System 6.0 or later preferred. $495. Timeworks, 444 Lake Cook Road, Deerfield, IL 60015-4919. (708) 948-9200. (Dec '89)

QuarkStyle ⚡⚡⚡⚡⚡

QuarkStyle is a collection of 72 templates for "instant" desktop publishing. The templates, which cover the gamut from business cards to newsletters, let you concentrate on a page's contents rather than its appearance. Version 1.01. Requires 1 megabyte and hard-disk drive. $295. Quark, 300 S. Jackson, Suite 100, Denver, CO 80209. (800) 543-7711 or (303) 934-0784. (Feb '89)

QuarkXPress ⚡⚡⚡⚡½

QuarkXPress is a powerful page-layout program with 24-bit color, style sheets, and search-and-replace on text attributes. Also does four-color separations. Page layout is handled through text and graphics boxes that add precision to layout but are difficult to master. Version 2.12. Requires Mac Plus and hard-disk drive. $795. Quark, 300 S. Jackson St., Suite 100, Denver, CO 80209. (303) 934-0784. CP until registered. (Jan '90)

RagTime ⚡⚡⚡½

RagTime is a page-layout program with extensive spreadsheet capabilities and powerful drawing tools. Spreadsheets and graphs can be linked so that they update each other dynamically. There are still some gaps (rotation of text is limited, for example) and lots of rough edges. The manual needs to be localized to America. Version 3.04. Requires Mac Plus or later. $599. RagTime USA, 702 Marshall St., Suite 322, Redwood City, CA 94063. (415) 780-1800. (June '90)

Ready,Set,Go! ⚡⚡⚡⚡½

Ready,Set,Go! combines an elegant interface with style sheets, fine-tuned typography, gray-scale editing, and spot color. The only program that provides thumbnail views of publications so you can rearrange pages. It's one of the first programs to store font information with documents, thus avoiding font-ID conflicts. Version 4.5a. Requires Mac Plus and a hard-disk drive. $495. Letraset USA, 40 Eisenhower Drive, Paramus, NJ 07653. (201) 845-6100. (Jan '90).

SmartForm Designer ⚡⚡⚡⚡

SmartForm Designer is a full-featured forms-design and -management program. Includes SmartForm Assistant for forms fill-out and handling. Easy-to-use design environment. Imports color graphics. Requires Mac Plus. Version 1.1.v1. $399. Claris Corp., 5201 Patrick Henry Drive, Santa Clara, CA 95052. (408) 987-7000. (Jan '90)

Springboard Publisher II ⚡⚡

Springboard Publisher II is a second try at a low-end template-based DTP package. It's unfortunately no better than the original program. The interface is poorly designed. Editing works only in the Actual Size view, making large changes awkward and difficult to preview. The text editor is far too slow, even on fast Macs. There are better tools for low-end DTP. Version 2.0. Requires Mac Plus or later. $195. Springboard Software, 7808 Creekridge Circle, Minneapolis, MN 55435. (612) 944-3912. (Apr '90)

TrueForm ⚡⚡⚡⚡

TrueForm creates an electronic form by scanning a preexisting paper one or importing from another design environment. No design capabilities. Automatic field definition. Has form caching for faster printing. The only forms package with a database link. Version 2.0. Requires Mac Plus and System 6.0 or later. $395. Adobe Systems, 1585 Charleston Road, P.O. Box 7900, Mountain View, CA 94039-7900. (800) 922-3623, (800) 344-8335, or (415) 961-4400. (Jan '90)

• PRESENTATIONS

Aldus Persuasion ⚡⚡⚡⚡⚡

Persuasion is the premier desktop-presentation program. Templating and outlining abilities have been improved considerably, and slide shows are handled well. There are very few flaws in this package. Version 2.0. Requires Mac Plus or later, System 4.1 or later, and a hard-disk drive. $495. Aldus, 411 First Ave. S., Seattle, WA 98104. (206) 622-5500. (Apr '90) ★'88 Eddy

CA-Cricket Presents ⚡⚡⚡⚡

CA-Cricket Presents is a presentation tool with a strong graphics emphasis. Good master template. Lacks import capability for text. Version 2.0. Requires System 4.2 or later. $495. Computer Associates, 10505 Sorrento Valley Road, San Diego, CA 92121-1698. (800) 531-5236. (Dec '88)

PowerPoint ⚡⚡⚡⚡

PowerPoint is an easy-to-use desktop-presentation tool. Good color schemes. Can send presentations to Genigraphics to produce color 35mm slides. Version 2.01. Requires System 4.1 or later, Mac Plus or later. $395. Microsoft Corp., One Microsoft Way, Redmond, WA 98052-6399. (800) 426-9400 or (206) 454-2030. (Aug '87) ★'87 Eddy

StandOut! ⚡⚡⚡⚡

StandOut! is a presentation program built like a publishing program, with strong text and graphics support. Automatic text flow around graphic objects. Lacks good graphic examples. Version 1.0. Requires Mac Plus or later. $295. Letraset USA, 40 Eisenhower Drive, Paramus, NJ 07653. (800) 343-8973 or (201) 845-6100. (Nov '88)

Visual Business No. 5 ⚡⚡⚡½

Visual Business No. 5 is a port of a DOS charting-and-presentation package. Excellent charting capabilities, including 3-D. More difficult to learn and use than Persuasion and PowerPoint. Can't store a whole presentation. Output Manager is included to let you print to a slide maker. Includes only four LaserWriter fonts. Not a good choice unless you specifically need one of its features. Version 1.02. Requires Mac II and System 6.0 or later; 2 megabytes required for Output Manager. $395; set of additional LaserWriter Plus fonts, $195. Visual Business Systems, 700 Lake St., Suite H, Ramsey, NJ 07446. (201) 327-2526. (Oct '89)

EDUCATION

Alphabet Blocks ⚡⚡⚡⚡⚡

Alphabet Blocks teaches prereaders the letters and sounds of the alphabet. The digitized voice of an on-screen elf is clear and pleasant. Very intuitive. Requires Mac Plus or later. $59.95. Bright Star Technology, 1450 114th Ave. S.E., Suite 200, Bellevue, WA 98004. (206) 451-3697. (May '88)

American Discovery ⚡⚡⚡

American Discovery is an interactive United States geography game that teaches states; capitals; and, in a roundabout manner, postal codes. Version 2.3. Requires Mac 512K. $49.95. Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. (408) 438-1990. (May '88)

Interactive Physics ⚡⚡⚡⚡⚡

Interactive Physics is the best physics-teaching tool available. It lets you set up and run experiments on-screen. There are limits to the number of masses and connectors, but that doesn't detract much from the overall program. It has an excellent manual. Version 1.0. Requires Mac Plus or later and System 6.0.3 or later. $449; education, $249. Knowledge Revolution, 497 Vermont St., San Francisco, CA 94107. (415) 553-8153. (Apr '90)★'89 Eddy

KidsMath ⚡⚡⚡⚡

KidsMath is a set of eight educational applications for three-to-eight-year-old children. The quality varies, ranging from adequate to superb. It doesn't support color or large monitors. Version 1.1. Requires any Mac with 512K of RAM. $49.95. Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. (408) 438-1990. (May '90)

LXR•TEST ⚡⚡⚡⚡

LXR•TEST generates tests from a database of questions. Makes it easy to modify and scramble test questions. Flexible output. Version 4.0. Requires Mac Plus or later. $149. Logic eXtension Resources, 9651-C Business Center Drive, Rancho Cucamonga, CA 91730. (714) 980-0046. (May '88)

Mavis Beacon Teaches Typing! ⚡⚡⚡⚡

Mavis Beacon Teaches Typing! has more features than a Selectric. Lots of diagnostics concerning typos. Incomplete documentation. Version 1.1. Requires Mac Plus or later. $49.95. The Software Toolworks, 19808 Nordhoff Place, Chatsworth, CA 91311. (818) 885-9000. CP (Nov '88)

NumberMaze ⚡⚡⚡⚡½

NumberMaze makes practicing basic math skills a game. Children ages 5 through 12 work their way through various mazes by solving numerical and word problems in counting, addition, subtraction, multiplication, and division. Selectable problem types and difficulty. Games can be customized with familiar names and additional levels. Based on five major math-textbook series for grades one through six. Version 1.0. Requires Mac 512K or later. $49.95. Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. (408) 438-1990.

Physics ⚡⚡⚡⚡½

Physics is a capable, intelligent, well-designed study aid. Covers vectors to thermodynamics to the nature of light. Animated experiments let you try out concepts. Requires Mac 512K or later. $99.95. Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101. (415) 492-3200. CP (Jan '88)

Reader Rabbit ⚡⚡⚡⚡⚡

Reader Rabbit teaches four-to-eight-year-olds how to read, with four elegant games that build on one another. Version 2.2. Requires Mac SE/30 or later. $59.95. The Learning

Co., 6493 Kaiser Drive, Fremont, CA 94555. (800) 852-2255. CP (June '88)

Type! ★★★★½

Type! is a typing tutorial that is both practical and flashy. It allows users to interrupt and move easily among functions, but use of the Return key and space bar are assumed but never explained. Version 1.0. Requires Mac 512K or later. $29.95. Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101. (415) 492-3200. (Nov '88)

TYPING INSTRUCTOR Encore ★★★★

TYPING INSTRUCTOR Encore recognizes that it's being used on a word processor. While it is easy to control, the program has some strange bugs. Version 3.0. Requires Mac 512K or later. $29.95. Individual Software, 125 Shoreway Road, Suite 3000, San Carlos, CA 94070. (800) 331-3313 or (800) 874-2042 (in CA). (Nov '88)

Typing Tutor IV+ ★★★

Typing Tutor IV+ consistently tests your use of all keys, including seldom-used ones. It's hard to maintain user's attention span, as the testing material is unimaginative. Version 1.2. Requires Mac 512K or later. $49.95. Simon & Schuster Software, 15 Columbus Circle, New York, NY 10023. (212) 373-8142. (Nov '88)

Voyager, the Interactive Desktop Planetarium ★★★★★

Voyager, the Interactive Desktop Planetarium, lets you view the sky as a star chart, as a celestial sphere, or as seen from anywhere in the universe. Includes an extensive astronomical database. Terrific learning tool. Version 1.2. $124.50. Carina Software, 830 Williams St., San Leandro, CA 94577. (415) 352-7328. (Sept '89)

ENTERTAINMENT

Apache Strike ★★

Apache Strike would have been an excellent arcade game in the late '70s. Now, it's passé. Navigate a helicopter to destroy ever-increasing numbers of enemy aircraft and tanks. Mac II-hostile. Version 1.1. Requires Mac 512K. $49.95. Silicon Beach Software, P.O. Box 261430, San Diego, CA 92126. (619) 695-6956. (July '88)

Balance of the Planet ★★★★

Balance of the Planet is similar to Chris Crawford's earlier classic, Balance of Power, except here the goal is global environmental survival. It's difficult to win, but eventually you should be able to get positive scores and your awareness of environmental issues will be greatly enhanced. Players can set the basic bias of the game. Version 1.0. $49.95. Accolade, c/o StarPat, 237 22nd St., Greeley, CO 80631. (800) 245-7744. (Aug '90)

Battle Stations! ★★★★

Battle Stations! is a deceptively simple game based on the pen-and-paper game of Battleship. Requires strategy on several levels. Makes excellent use of the Mac's sound and graphics. Fun, casual game, especially when the Mac is one of the players. Requires Mac 512K or later. $30. Timeline, P.O. Box 60, Ypsilanti, MI 48197. (313) 439-3828. (June '87)

Beyond Dark Castle ★★★½

Beyond Dark Castle brings back Prince Duncan in an encore performance to run, jump, and beat his way to victory. But really, it's just more of the same. Version 1.0. Requires Mac 512KE or later. $49.95. Silicon Beach Software, P.O. Box 261430, San Diego, CA 92126. (619) 695-6956. (Aug '88)

Beyond Zork ★★★★½

Beyond Zork is yet another installment in the famous Zork series of text adventures. Find the fabled Coconut of Quendor to restore failing magic in this expert-level game. On-screen mapping and the Mac's window environment are utilized. $19.95. Infocom, 3885 Bohannon Drive, Menlo Park, CA 94025. (415) 329-7616. (Apr '88)

Bomber ★★★★

Bomber is a great HyperCard-based simulation. You attack Germany during WW II, flying a B-17. Great sound (you'll probably need 2 megabytes of RAM); headphones are provided so you don't disturb others. Requires HyperCard 1.2.1 or later. $39.95. In-Line Design, 70 W. 95th St., Suite 26F, New York, NY 10025. (212) 222-4837. (Feb '90)

Chessmaster 2000 ★★★★★

Chessmaster 2000 is a masterful chess program that will appeal to novices and experts. You can view the board from 2-D or 3-D perspectives and also turn it for a better look. Play is smooth and easy, and the program responds by voice. You may get tired of hearing "Gotcha," though. Version 1.02. $44.95. The Software Toolworks, 19808 Nordhoff Place, Chatsworth, CA 91311. (818) 885-9000. CP (July '87)

Chuck Yeager's Advanced Flight Trainer ★★

Chuck Yeager's Advanced Flight Trainer doesn't quite have the right stuff to hold interest for long. Simplistic controls. Lacks features found in versions for other computers. Version 1.0. Requires Mac 512KE or later. $49.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. (800) 245-4525 or (415) 571-7171. (Nov '88)

Crystal Quest ★★★★★

Crystal Quest combines all the good elements of nearly every video game ever made. Move a piece around to gobble up points and crystals. Shoot the nasties, and get through the goal before they get you. Excellent sound effects. In color on the Mac II. Version 2.2X. Requires Mac 512K or later. $49.95. Casady and Greene, P.O. Box 223779, Carmel, CA 93922. (408) 624-8716. (Apr '88) ★'88 Eddy

Dark Castle ★★★★★

Dark Castle is an outstanding achievement in action games, integrating sound with superb animation and graphics. You'll need better-than-average hand-eye coordination, but it's well worth the effort. Version 1.1. Requires Mac 512K or later. $49.95. Silicon Beach Software, P.O. Box 261430, San Diego, CA 92126. (619) 695-6956. (Apr '87) ★'87 Eddy

Falcon ★★★★½

Falcon simulates an F-16 fighter jet with gut-tightening, sweat-making realism. Go against MiGs, and dodge SAMs. Can be played via modem against other humans. Version 2.2. Requires Mac Plus or later. $59.95. Spectrum HoloByte, 2061 Challenger Drive, Alameda, CA 94501. (415) 522-3584. (May '88)

Ferrari Grand Prix ★★★★

Ferrari Grand Prix is an exciting race-car simulation game. Mastering it takes quite a bit of time and effort. Startup course and four other courses are built in to the program. You can also design custom courses and backgrounds. Version 1.6. Requires Mac 512K or later. $59.95. Bullseye Software, P.O. Drawer 7900, Incline Village, NV 89450. (702) 265-2298. CP (July '87)

Fool's Errand ★★★★★

Fool's Errand is an outstanding collection of 80 puzzles woven around a mythical theme of an evil priestess and the search for wisdom. Version 2.0. Requires Mac 512K or later. $49.95. Miles Computing, 5115 Douglas Fir Road, Suite I, Calabasas, CA 91302. (818) 340-6300. (July '88)

Halls of Montezuma ★★★★½

Halls of Montezuma is a classic move-the-units war game that is adapted for the Mac. The scenarios cover famous U.S. Marine battles. It provides color and black-and-white versions for all scenarios, with good performance and play. You can even create your own scenarios. Requires Mac Plus or later. $44.95. Electronic Arts, 1810 Gateway Drive, San Mateo, CA 94404. (415) 571-7171. (Apr '90)

Handwriting Analyst ★★★★½

Handwriting Analyst produces a personality profile based on answers to questions about your handwriting. It's simple, and the results will amaze and astound. Version 3.0. $69.95. Ciasa, 2017 Cedar St., Berkeley, CA 94709. (415) 644-2771. (Apr '88)

Ishido ★★★★★

Ishido is a strategy game with a few twists. So far it's available only as a limited edition in an ultraexpensive, very fancy wood box. The game is good but not great. Its programming is elegant and very polished. There are many options, including solitaire and multiuser modes. Requires Mac Plus or later. $495. Publishing International, 333 W. El Camino Real, Suite 222, Sunnyvale, CA 94087. (408) 738-4311. (May '90)

Leather Goddesses of Phobos ★★★★★

Leather Goddesses of Phobos is another in the long line of witty, entertaining Infocom text adventures. It lets you choose your sex and comes with a 3-D comic and a scratch 'n' sniff card. It has three levels of play: tame, suggestive, and lewd. $19.95. Mediagenic, 3885 Bohannon Drive, Menlo Park, CA 94025. (415) 329-0500. (Feb '87)

Lunar Rescue ★★★★½

Lunar Rescue puts you in the role of a benevolent trader ready to save a moon colony from invasion. Blast the enemy while you travel from town to town trading goods for the supplies you need for your mission. Version 1.0. Requires Mac 512KE or later. $59.95. XOR Corp., 7607 Bush Lake Road, Minneapolis, MN 55435. (800) 635-2425, (612) 831-0444. CP (Jan '89)

Mac Pro Football ★★★★

Mac Pro Football is a terrific sports simulation that gives you the chance to pit any combination of 38 Super Bowl teams against each other and direct team play. It comes with excellent, detailed, and necessary documentation. Play selection can get a bit Byzantine. Version 2.1. $49.95. The Avalon Hill Game Co., 4517 Harford Road, Baltimore, MD 21214. (800) 638-9292. CP (Mar '87)

MacRacquetball ★★★½

MacRacquetball uses digitized videos and sounds of professional players for a realistic simulation. Has lots of control settings and can be played with someone else via a modem or between hard-wired Macs. Turn off hard-disk drives before playing. Version 2.0. $59.95. XOR Corp., 7607 Bush Lake Road, Minneapolis, MN 55435. (800) 635-2425 or (612) 831-0444. CP (Oct '87)

NFL Pro League Football ★★★★½

NFL Pro League Football is a professional football-league

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MUSE AD-14

simulation that encourages people to play people, not the machine. Fast, with lots of stats. Spotty manual. Version 1.0. Requires Mac Plus or later. $49.95. Micro Sports, Inc., 1410 Mountain Ash Drive, Hixon, TN 37343. (800) 543-6735. (Apr '88)

Ogre ★★★★

Ogre is a strategy tank game played on a hexagon grid. The ogre is an intelligent cybertank out to smash your command post. Customize your defense. Exceptionally good Mac interface. Has two-player option. $29.95. Origin, 110 Wild Basin Road, Suite 330, Austin, TX 78746. (512) 328-0282. CP (Nov '87)

Patton vs. Rommel ★★★★

Patton vs. Rommel is a traditional-style strategic war game, covering events in Normandy in 1944. While complex, it's well designed and very playable. $19.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. (800) 245-4525 or (415) 571-7171. CP (Apr '87)

Pipe Dream ★★★★★

Pipe Dream is an addictive game that demands a nearly perfect mixture of strategy and speed. You must build a pipeline fast enough to prevent the stuff in the line from running out — that's it. It has 36 levels of play. Requires Mac Plus or later. $39.95. LucasFilm Ltd., Games Division, P.O. Box 10307, San Rafael, CA 94912. (415) 662-1902. CP: must use an included decoding wheel. (May '90)

Puppy Love ★★★★½

Puppy Love is a combined game and teaching tool. As you teach your puppy tricks and routines, you learn the basics of programming logic. Great fun for all ages. Does not run from a hard-disk drive. Version 1.0. $29.95. Addison-Wesley, Route 128, Reading, MA 01867. (617) 944-3700, ext. 2504. CP (Mar '87)

Quarterstaff ★★★★

Quarterstaff is a fantasy adventure game of the typical good-versus-evil variety. Ability to use characters in other adventures gives this game a lot of potential for development. Version 1.2. Requires Mac Plus or later. $49.95. Simulated Environment Systems, 800 S. Pacific Coast Highway, Redondo Beach, CA 90277. (Mar '88)

Seven Cities of Gold ★★★★

Seven Cities of Gold is an educational program masquerading as an adventure game and is practically unique in being good in both respects. You are to land (not the easiest part) in the New World and attempt to placate the natives, seed a few missions, and collect gold. Version 1.0. $19.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. (800) 245-4525 or (415) 571-7171. CP (June '87)

Shadowgate ★★★★½

Shadowgate is an icon-based graphic adventure. You, as the seed of prophecy, must save the world from the evil warlock. Far surpasses all others with great animated graphics, sound, and adventure. $49.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60062. (708) 480-7667. CP (Dec '87)

Shanghai ★★★★★

Shanghai is a wonderful strategy game. The new version adds gorgeous color, good sound, and new intelligence. The game can now tell you when there are no more moves. Version 2.0. Requires any Mac. $29.95. Mediagenic, 3885 Bohannon Drive, Menlo Park, CA 94025. (415) 329-0500. (June '90)

SimCity ★★★★

SimCity is an animated game that's also a city-planning simulator. You can work on any one of eight scenarios included in the package or build your own city from the ground up. Evaluation window gives you instant feedback on your efforts. Version 1.2. Requires Mac 512K or later. $49.95; Terrain Editor, $24.95. Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101. (415) 492-3200. CP (June '89) ★'89 Eddy

SimCity Supreme ★★★★★

SimCity Supreme is the color version of SimCity. Has all the advantages and virtues of the original, plus it's not copy protected. Version 1.1c. Requires Mac 512K or later. $69.95. Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101. (415) 492-3200. CP (June '89)

Solitaire Royale ★★★★

Solitaire Royale is a collection of eight solitaire card games. The Tour mode cycles through each game. Tournament deals the same hand for several players. Monochrome, version 1.1; color, version 1.0. $34.95. Spectrum HoloByte, 2061 Challenger Drive, Alameda, CA 94501. (415) 522-3584. CP (May '88)

Space Quest ★★★★

Space Quest is a 3-D animated adventure in which you play a janitor in a dicey situation. All you have to do is get off your ship before it explodes and save the Earnon System. Version 2.0. Runs on any Mac. $49.95. Sierra On-Line, P.O. Box 485, Coarsegold, CA 93614. (209) 683-4468. CP (Sept '87)

Star Fleet I: The War Begins! ★★★★

Star Fleet I: The War Begins! is a space opera of the Star Trek variety. Rise through the ranks from ensign to admiral in this serialized adventure. Version 2.1. Requires Mac 512K or later. $55. Interstel Corp., P.O. Box 57825, Webster, TX 77598. (713) 486-4163. (May '88)

Strategic Conquest Plus ★★★★½

Strategic Conquest Plus challenges you to discover an unexplored world and conquer it by manufacturing and deploying armies, ships, and planes. A two-disk game that doesn't support an external drive. Version 2.055. Requires Mac 512K or later. $59.95. Premiere Technology, P.O. Box 11138, San Francisco, CA 94101. (415) 882-7766. CP (Feb '88)

Synchronicity ★★★★

Synchronicity is mood-control software. Based on the *I Ching*, it can be used as a stress-reduction tool. Beautiful artwork and sounds. Even skeptics like it. Version 2.0. Requires Mac Plus or later. $49.95. Visionary Software, P.O. Box 69191, Portland, OR 97201. (503) 246-6200. (Mar '90)

The Vietnam War ★★★★★

The Vietnam War is a stack that uses HyperCard fully and brilliantly to present a fair view of the Vietnam conflict. It is so compelling that it's impossible to put down. Version 2.0. Requires Mac Plus or later, HyperCard, and a hard-disk drive. $24.95. Regeneration Software, 377 Collado Drive, Scotts Valley, CA 95066. (408) 438-5791. (Apr '90)



FINANCIAL MANAGEMENT

• BUSINESS

A4 ★★★½

A4 is based on 4th Dimension, the relational database, and thus has 4D's power and drawbacks. It integrates general ledger, accounts payable, and accounts receivable modules. Users familiar with 4D can easily customize it. Excellent multiuser capabilities. There's no payroll or last-in-first-out system and it can be very slow. Version 2.0. Requires Mac SE or later, at least 2.5 megabytes of RAM, and 4th Dimension 2.0.10 or later. $2,000. Softek Design, 882 Calgary Way, Golden, CO 80401. (303) 526-0606. (May '90)

Accountant, Inc. Professional ★★★★

Accountant, Inc. Professional does a good job of establishing itself as a contender in the increasingly crowded small-business-accounting market. The system offers a great deal of functionality, a high degree of conformance to the Mac interface, and solid accounting and bookkeeping fundamentals. Uses double-entry accounting. Version 1.01. $299.95. Softsync, 162 Madison Ave., New York, NY 10016. (212) 685-2080. (Aug '90)

ACCPAC Bedford Simply Accounting ★★★★

ACCPAC Bedford Simply Accounting has six ledgers and eight journals to handle the needs of most small-to-medium-sized businesses. Better Mac interface than most. Payroll tax labels can't be modified, forcing you to subscribe to Bedford's yearly update service. Version 1.05. Requires Mac Plus or later. $349; update service, $100 per year. Computer Associates International, 1240 McKay Drive, San Jose, CA 95131. (800) 533-2070 or (408) 432-1727. (Sept '88)

atOnce! ★★★★½

atOnce! is an integrated accounting package with general-ledger, accounts-payable, accounts-receivable, and payroll modules. Primarily for small businesses. Features very good security, customizable reports, flexible fiscal calendar with 12 or 13 periods per fiscal year, and up to 26 open periods stored on-line. Version 1.0. Requires Mac Plus or later, two 800K drives, and System 4.1 or later; hard-disk drive recommended. $495. Layered, The Schrafft Center, 529 Main St., Boston, MA 02129. (617) 241-5431. (Nov '89) ★'89 Eddy

Back to Basics Professional Accounting ★★★★

Back to Basics Professional Accounting is a powerful double-entry accounting program for small businesses. Includes general-ledger, accounts-receivable, and accounts-payable modules. Extensive manual has many examples. Report capabilities are excellent. Version 2.0. Requires Mac Plus or later. $199. Peachtree Software, 1505 Pavilion Place, Norcross, GA 30093. (800) 247-3224. (May '87)

Business Sense ★★★★½

Business Sense is a basic double-entry accounting package with a one-write approach. It reports on two years of data. Unusually strong at importing and exporting data. Version 1.3. Requires Mac Plus or later. $495. Digital Etc., 1749 14th St., Suite 203, Santa Monica, CA 90400. (213) 452-5636. (May '90)

CashLedger ★★★★

CashLedger is similar to MultiLedger but uses cash-basis accounting rather than accrual accounting. Double-entry bookkeeping is supported transparently. The program doesn't have transaction journals, customer credit limits, or finance-charge calculations.

Version 1.3. Requires Mac Plus or later. $195; upgrade to MultiLedger, $200. CheckMark Software, 1520 E. Mulberry, Suite 200, Fort Collins, CO 80524. (800) 444-9922 or (303) 484-3541. (May '90)

Components General Ledger ★★★★★

Components General Ledger is part of an integrated accounting series. Provides state-of-the-art flexibility, integrity, and functionality. Report generator may be strong enough to entice you to import data and use it with other accounting systems. Especially appealing to users with database or graphics backgrounds. Version 1.0. Requires Mac Plus or later and System 4.1 or later. $595. Satori Software, 2815 Second Ave., Suite 560, Seattle, WA 98121. (206) 443-0765. (Oct '89)

Computerized Classic Bookkeeping ★★★★½

Computerized Classic Bookkeeping is an Excel-based integrated accounting system. The spreadsheet interface is intuitive, similar to traditional paper journals and ledgers. Supports custom reports, fully detailed audit trail, and password protection. Analysis can be done in Excel at any time. A good alternative to bigger dedicated systems and a good choice for those currently using paper ledgers. Version 2.2. Requires Mac Plus or later, hard-disk drive, and Excel 1.5. $395. Absolute Solutions, 3142 Vista Way, Suite 400, Oceanside, CA 92056. (800) 458-3399 or (619) 966-8000. (Jan '90)

Flexware ★★★★

Flexware is based on the Flexware proprietary language. This true multiuser accounting system must be professionally installed — it can't just be used off the shelf. It is highly modular and extremely customizable. Nine basic modules cover all aspects of accounting. Can automatically pass data into Excel for further analysis. Version 6.02C. Requires Mac Plus or later. $895 per module, except Order Processing and Purchasing, $795 each; Point-of-Sale, $695; Job Cost, $995. Flexware, 150404 E. Valley Blvd., City of Industry, CA 91746. (800) 527-6587 or (818) 961-0237. (May '90)

Great Plains Accounting Series ★★★★

The Great Plains Accounting Series consists of ten modules covering all aspects of accounting. Excellent and extensive documentation. It looks and feels like a mainframe accounting system. There's excellent functionality for serious users. Version 5.2. Requires Mac SE or later. $795 per module, except Executive Advisor, $595; Network Manager and Job Cost, $995 each; and Import Manager, $495. Great Plains Software, P.O. Box 9739, Fargo, ND 58109. (800) 345-3276 or (701) 281-0550. (May '90)

Insight ★★★★½

Insight is a high-powered accounting program for small-to-medium-sized businesses. Modules include Accounts Receivable, Accounts Payable, General Ledger, Inventory Control, Time Billing, and Payroll. Requires Mac 512K or later and hard-disk drive. $695 per module. Layered, The Schrafft Center, 529 Main St., Boston, MA 02129. (617) 242-7700. (Dec '86) ★'86 Eddy

Insight Payroll ★★★★½

Insight Payroll is part of the Insight series and is best used with the other modules. It features an icon bar for quick access to all parts of the program. The large manual is excellent. It has special tax-law updating capabilities (a major consideration in a payroll program). Version 1.0. $695 (includes one free tax update). Layered, The Schrafft Center, 529 Main St., Boston, MA 02129. (800) 622-4436 or (617) 242-7700. (Apr '90)

MacInvoice ★★★½

MacInvoice is an invoicing system for small businesses. Limited formatting ability; excellent printing ability. Version 1.0. Requires Mac 512K or later. $69.95. Synex, 692 Tenth St., Brooklyn, NY 11215. (718) 455-1522. (Nov '89)

MultiLedger ★★★★½

MultiLedger is an integrated general ledger, accounts receivable, accounts payable, and inventory system. It does batch processing, handles multiple companies, tracks budgets, and has high-resolution-graphic statement printing. Double-entry bookkeeping is supported transparently. There are no transaction journals or customer credit limits. Version 1.3. Requires Mac Plus or later. $395. CheckMark Software, 1520 E. Mulberry, Suite 200, Fort Collins, CO 80524. (800) 444-9922 or (303) 484-3541. (May '90)

Multi-user Desktop Accounting ★★★★

Multi-user Desktop Accounting is based on the Omnis 3 database. It sets the standards for multiuser performance and accounting functionality in the off-the-shelf market. There are nine fully integrated modules and eight user-security classifications. Version 2.05. Requires Mac Plus or later. Single-user version, $1,795; up to five users, $2,795. Logisoft, 1291 E. Hillsdale Blvd., Foster City, CA 94404. (415) 570-7811. (May '90)

Plains & Simple ★★★★

Plains & Simple is an excellent one-write accounting system. Offers full general-ledger, accounts-receivable, accounts-payable, and reporting modules. Has 3-to-6-digit account numbers, 14 predefined account categories, full audit trail, and multiple checking accounts. Provides more than 20 comprehensive reports and handles multiple companies. It defaults to accrual-basis accounting. Version 1.05. Requires Mac Plus and a hard-disk drive. Great Plains Software, 1701 S.W. 38th St., Fargo, ND 58103. (701) 281-0550. (May '90) ★'87 Eddy

Project Billing ★★½

Project Billing handles all aspects of client accounting. It produces professional-looking bills. It's good at batch entry and assigning different tax rates to various items. The interface is clumsy, and "action" descriptions are too limited. It lacks a DA for recording and data entry. Version 1.57. Requires Mac 512K or later. $595. Satori Software, 2815 Second Ave., Suite 560, Seattle, WA 98121. (206) 443-0765. (Apr '90)

Sales and Marketing Forecast Toolkit ★★★★½

The Sales and Marketing Forecast Toolkit is an Excel-based productivity package. The 18 worksheets, 8 charts, and 1 macro sheet let you create graphs visually and then show you the numbers needed to substantiate it. This real-world approach works well. Version 2.0. Requires Mac Plus or later. $129.95. Palo Alto Software, 260 Sheridan Ave., Suite 219, Palo Alto, CA 94306. (415) 325-3190. (May '90)

TimeMinder ★★★★

TimeMinder is an application for analysis and a DA for recording data. Each client's time slips are stored in separate files, which is a drawback. Batch entry is easy, however. The package needs some interface polish, and layout isn't WYSIWYG, which makes reporting unnecessarily difficult. Version 2.1.6. Requires Mac Plus or later. $299. Aatrix Software, P.O. Box 5359, Grand Forks, ND 58206. (701) 746-7202. (Apr '90)

Timeslips III ★★★★½

Timeslips III is for people who bill by the hour. It has an application for analysis and reporting as well as a DA for recording and entering data. Batch entry is easy. Most descriptions can be customized. There's excellent documentation and on-line help. Recording data on the wrong time slip is too easy — it needs to be fixed. Version 1.1h. Requires Mac 512KE or later. $299.95. Timeslips, 239 Western Ave., Essex, MA 01929. (508) 768-6100. (Apr '90) ★'88 Eddy

• PERSONAL

CheckFree ★★★½

CheckFree is an electronic bill-paying service. Bills are paid by an electronic-to-check method or by draft. Unfortunately, users have no way of knowing which method CheckFree uses for a particular payment, so the service requires a minimum of four days' notice on all payments. Software works well but does have problems with MultiFinder. Version 1.5. $29.95. $9 for the first 20 payments per month; $3 per 10 payments above 20. Checkfree Corp., 720 Greencrest Drive, Westerville, OH 43081. (614) 898-6000. (Aug. '90)

Checkwriter II ★★★★

Checkwriter II is a checkbook-based personal or small-business accounting program. Can be used as both a DA and an application. Produces attractive reports. Version 1.0. Requires Mac 512KE or later. $59. Aatrix Software, P.O. Box 5359, Grand Forks, ND 58206-5359. (800) 426-0854. (Mar '90)

MacInTax ★★★★★

MacInTax is an excellent tool for preparing tax forms. Intuitive and easy to use, it's consistently the best in its class. Accepts data from the leading personal-finance programs. Good built-in help. Liberal upgrade policy for current owners. Prints IRS-accepted forms on all LaserWriters and ImageWriters. California, New York, and Massachusetts forms sets also available. First year, $99; federal, $119; state, $65. SoftView, 1721 Pacific Ave., Suite 100, Oxnard, CA 93033. (805) 385-5000. (Mar '87) ★'86, '89 Eddy

MacMoney ★★★★

MacMoney is a full-featured financial manager. Produces a wide and useful variety of reports and graphs. Version 3.5. Requires Mac 512KE or later and printer. $119.95. Survivor Software, 11222 La Cienega Blvd., Suite 450, Inglewood, CA 90304. (213) 338-0155. (July '88) ★'86 Eddy

Managing Your Money ★★★★½

Managing Your Money, Andrew Tobias' well-respected and -supported personal financial manager, has added a slew of improvements to its sea of features. It can print checks and keep detailed accounts. An excellent choice for users with moderately complex finances (more than just a checkbook). Version 3.0. Requires Mac Plus or later. $219.98. MECA Ventures, 327 Riverside Ave., Westport, CT 06881. (203) 226-2400. (Apr '90)

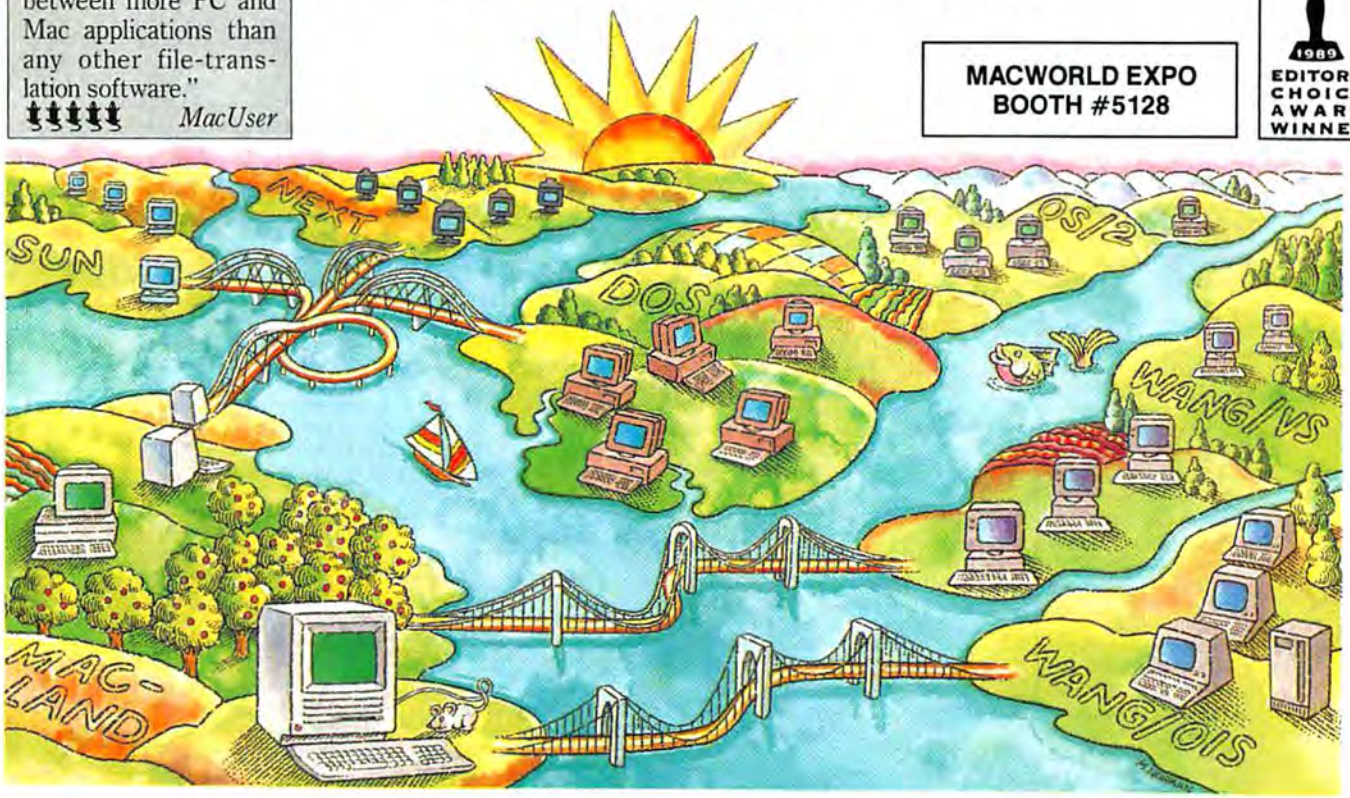
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Mind Your Own Business ♦♦♦♦½

Mind Your Own Business is an excellent value. It has an integrated general ledger, checkbook, accounts receivable, accounts payable, and inventory system. There's no integrated payroll. It has a pleasant, intuitive feel. MYOB is best for single-company use. It lacks department breakouts. Version 1.0. Requires Mac Plus or later. $99. Teleware, The Rotunda, 22 Hill Road, Parsippany, NJ 07054. (800) 322-6962 or (201) 334-1154. (May '90)

Quicken ♦♦♦♦♦

Quicken is the best tool for home budgets, cash-flow management, and tax-record keeping. Mimics your checkbook, so tracking your finances is easy and intuitive. Provides detailed reports supporting tax deductions and sources of income for Schedules A, B, C, D, and E; Forms 1040 and 2106; and Canadian tax forms. Version 1.5. Requires Mac 512K or later and System 4.1 or later. $59.95. Intuit, P.O. Box 3014, Menlo Park, CA 94026. (415) 322-0573. (Dec '89) ★'88 Eddy

Wall Street Investor ♦♦♦♦

Wall Street Investor helps spot stock-market trends using technical analysis. Downloads information from an electronic service. Good charting ability. Previously known as Market Pro. Version 3.0. Requires Mac Plus or later, Hayes-compatible modem, and an I.P. Sharp account. $695. Pro Plus Software, 2150 E. Brown Road, Mesa, AZ 85213. (602) 461-3296. (Oct '88)

FREEWARE AND SHAREWARE

Apple File Exchange (AFE) ♦♦♦♦

Apple File Exchange (AFE) is one of the utilities that comes free with the Mac System Tools. AFE offers a simple interface and works with a wide variety of data-transfer methods. Its best feature is that it works with current and future MacLinkPlus translators. By itself, its translators are limited to MacWrite generic text. Free. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (Oct '89)

INIT cdev ♦♦♦

INIT cdev is a no-frills freeware INIT manager that lets you turn INITs on and off simply by clicking on the names in a scrollable list. INIT cdev is accessible at startup, but it cannot make temporary changes. Version 3.0. Requires Mac 512K or later. Free; available on GEnie and CompuServe. (Aug '89)

Klondike ♦♦♦♦

Klondike is simple to play and nearly impossible to stop playing. This version of solitaire uses video-game-like scoring to create a superb, totally addictive game. S Version 3.6. Shareware, $10. Unison Software, 675 Almanor, Sunnyvale, CA 94086. (415) 968-7511. (Dec '87)

Mug Shot ♦♦♦♦

Mug Shot is a simple program that looks inside your Mac and then tells you about it. In addition to the usual hardware data, Mug Shot lists all installed DAs, startup documents (INITs), cdevs, and RDEVs. This data can be vital if you run into conflicts or problems. Free. Mi Concepts, P.O. Box 8822, Kentwood, MI 49508. (Sept '89)

Set Clock ♦♦♦♦½

Set Clock makes a ten-second phone call to Leitch Video's master clock driver (near the East Coast) and then sets your Mac's time within one-second accuracy. Version 1.8.1. Requires 300-bps or faster modem. Free. Leitch Video International, 10 Dyas Road, Don Mills, Toronto, Ontario M3B 1V5, Canada. (Nov '89)

Sound Manager Package ♦♦♦♦½

Sound Manager Package is a group of well-implemented sound-file manipulators and players. The best, most versatile utility set available for sound (as opposed to music) aficionados. As a bonus, many useful and amusing sounds are included on-disk. Version 1.40. Requires Mac 512K or later and System 4.1 or later. Shareware, $20. Ettore Software, 67 Rue de la Limite, 1970 W-Oppem, 011 322 235 5978 Belgium. Include International Reply Coupon with all information requests. (Nov '89)

SoundMaster ♦♦♦♦½

SoundMaster is an elegant cdev that lets you assign sounds to a wide range of actions, including startup, shut down, disk insertion, and assorted key presses. Version 1.4. Requires System 4.1 or later. Shareware, $15; shipping, $5. Bruce Tomlin, 15801 Chase Hill Blvd., #109, San Antonio, TX 78256-1037. (Nov '89)

SuperClock! ♦♦♦♦♦

SuperClock! is simply the best on-screen time indicator or clock. Can work properly in every environment and also has excellent timer and alarm functions. Version 3.8. Requires System 4.1 or later. Free. Steve Christensen, CompuServe 76174,1712; AppleLink Christense1. (Nov '89)

Zoo Friends ♦♦♦♦

Zoo Friends is a learning, exploring experience for children in grades two through four. Contains five animal exhibits and a Learning Center. Shareware, available on CompuServe for $9, or $9 plus $3 for disk and shipping from David J. Combs, 3517 Germann Court, Lexington, KY 40503. (Dec '89)

GRAPHICS AND DESIGN

Capture ♦♦♦♦½

Capture is a most reliable screen-capture utility. Can capture full screens or any area to either the Clipboard or a PICT file. Supports 8- and 32-bit color. May have to be renamed to avoid INIT conflicts. Version 2.0. Requires System 5.0 or later. $59.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. (818) 991-6540. (Jan '90)

ClickPaste ♦♦♦½

ClickPaste puts the functionality of an ordered Scrapbook at the tip of your cursor. Most useful if you cut and paste frequently to and from your Scrapbook. Version 1.1.1. Requires Mac Plus or later and System 6.0 or later. $99.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. (818) 991-6540. (Sept '89)

The Curator ♦♦♦♦½

The Curator catalogs your art and graphics so it's easy to see what's what and where it is. Supports PICT, TIFF, EPSF, PostScript, MacPaint, and more. Changes creator types. Version 1.05. Requires Mac 512K or later. $139.95. Solutions International, 30 Commerce St., Williston, VT 05495. (802) 658-5506. (Sept '88)

Flexigraphs ♦♦♦♦½

Flexigraphs starts with basic charts and lets you modify them in a staggering variety of ways. The simple, elegant interface lets you add attractive details and work on certain parts of charts while locking other areas down. Version 1.0. Requires Mac Plus or later. $179. TreeStar, 1802 Hillside Road, Santa Barbara, CA 93101. (805) 682-4096. (Apr '90)

ImageStudio ♦♦♦♦½

ImageStudio puts a photo-retouching lab on the desktop. Editable brushes let you modify digitized images in 65 gray levels. Version 1.5. Requires Mac Plus or later. $495. Letraset USA, 40 Eisenhower Drive, Paramus, NJ 07653. (201) 845-6100. (June '88)

LANDesign ♦♦♦♦½

LANDesign is versatile land-surveying software. It has a range of options that allow it to work the way surveyors worked before they had a Macintosh to help them. This intelligent program is quite easy to use. Version 1.13. Requires Mac 512KE or later and System 4.2 or later; hard-disk drive recommended. $595. Compuneering, 113 McCabe Crescent, Thornhill, Ontario L4J 2S6, Canada. (416) 738-4601. (Sept '89)

MultiClip ♦♦♦♦½

MultiClip lets you create as many Clipboards as memory allows. Can be used as a replacement for the Clipboard and Scrapbook. Has limited editing capabilities but lots of customizing possibilities. Version 2.0. Requires Mac Plus or later and System 6.0.2 or later. $99. Olduvai Software, 7520 Red Road, Suite A, South Miami, FL 33143. (800) 822-0772. (Sept '89)

PhotoMac ♦♦♦♦

PhotoMac is a powerful color-retouching tool for photographs in PICT and TIFF. Displays and edits in 8-bit mode; saves in 8- or 24-bit modes. Makes color separations, but process requires substantial disk space. Version 1.14. Requires Mac II with 2 megabytes, color monitor, 8-bit video card, and a hard-disk drive. $795. Data Translations, 100 Locke Drive, Marlboro MA 01752. (508) 481-3700, ext. 649. (July '89)

PictureBase ♦♦♦♦½

PictureBase is a powerful graphics librarian. Can store paint- and PICT-formatted items and attach keywords for later search and retrieval. Version 1.2.3. $99. Symmetry, 8603 E. Royal Palm, Suite 220, Scottsdale, AZ 85258. (800) 624-2485. (Sept '87) ★'86 Eddy

PictureBook ♦♦♦♦♦

PictureBook is a superb Scrapbook replacement. It catalogs your Scrapbook and lets you resize and/or crop anything that can be copied to the Clipboard. There's a lot of power here, and the interface is excellent. Version 3.2. Requires Mac 512K or later; hard-disk drive recommended. $69.95. Loop Software, P.O. Box 1249, Menlo Park, CA 94026. (800) 288-7631. (Sept '89)

Smart Art ♦♦♦♦♦

Smart Art is a nifty PostScript utility disguised as a DA. It creates special effects with both text and graphics, and it lets you import EPSF files into any program. Has 15 text effects. Version 1.0.1. Requires Mac Plus or later and PostScript printer. $149.95. Emerald City Software, 1585 Charleston Road, P.O. Box 7900, Mountain View, CA 94039-7900. (800) 447-3577 or (415) 324-8080. (Oct '89)

Smart Art II and III ♦♦♦♦♦

Smart Art II and III are the second and third volumes of Smart Art. The programs have an export facility and a much-improved DA that includes direct printing. Volume II includes graphic elements; Volume III has text effects. Version 2.0. Requires Mac Plus or

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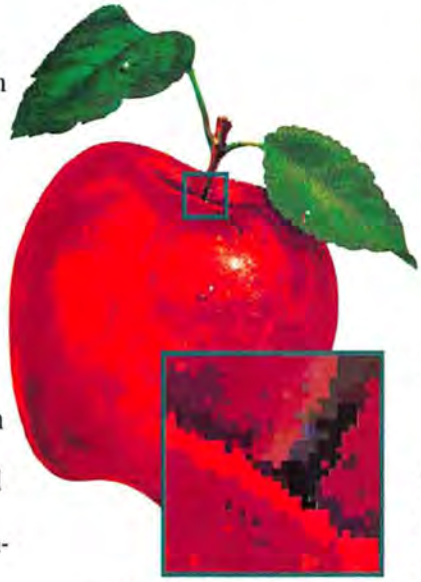
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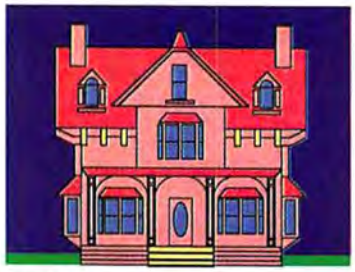
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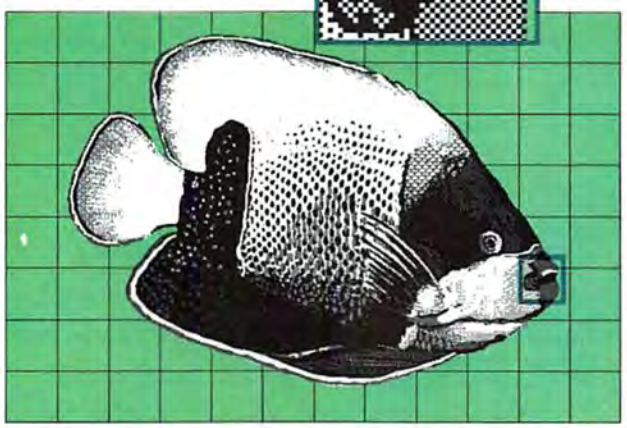


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later and PostScript printer. $149.95 per volume. Emerald City Software, 1890 Shoreline Blvd., Mountain View, CA 94043. (800) 447-3577 or (415) 324-8080. (Jan '90)

SmartScrap and The Clipper ⭐⭐⭐⭐½

SmartScrap and The Clipper are two useful DA utilities for graphics work. SmartScrap is a major enhancement to the standard Scrapbook DA. The Clipper provides a transparent Clipboard window that lets you resize or crop a graphic to the area in which it will be pasted. Version 2.01. Requires Mac Plus or later. $89.95. Solutions International, 30 Commerce St., Williston, VT 05495. (802) 658-5506. (July '87) ★'87 Eddy

SnapJot ⭐⭐⭐⭐⭐

SnapJot is a utility that lets you capture screens or parts of screens. Differs from similar products in that the captured window remains on-screen in a real window and you can use it as you work. Version 2.0. Requires System 4.1 or later. $49.95. Wild Flower Software, 21W171 Coronet Road, Lombard, IL 60148. (708) 916-9350. (Oct '89)

Streamline ⭐⭐⭐½

Streamline is Adobe's dedicated PostScript auto-trace package. Auto-tracing is all it does. Can quickly produce nearly print-ready traces with little tweaking. Retains original images' black-and-white values. Final touch-ups must be completed in Illustrator 88 or a similar program. Expensive for a single-function utility. Version 1.0. Requires Mac Plus or later and System 4.2 or later; 2 megabytes recommended. $395. Adobe Systems, 1585 Charleston Road, P.O. Box 7900, Mountain View, CA 94039-7900. (800) 922-3623. (Nov '89)

• CAD

Aperture ⭐⭐⭐½

Aperture combines a CAD program with a database. Some of its numerous features are difficult to access, but the package is very useful overall. The database is a decent flat-file manager, while the drawing portion of the package has color support, infinite zoom, libraries, and many other power tools. Version 1.02. Requires Mac II or later. $795. Aperture Technology, 84 W. Park Place, Stamford, CT 06901. (203) 975-7587. (Apr '90)

Ashlar Vellum ⭐⭐⭐⭐½

Ashlar Vellum is an entirely new type of CAD package with artificial-intelligence elements. The cursor can inform you about its exact position (midpoint, end, and so on). Its full set of tools includes a library of resizable parametric shapes. Performance is good if you have a fast Mac and lots of RAM (at least 4 megabytes). Can import and export DXF, but not IGES, files. Version 1.0. Requires Mac II series or SE/30. $995. Ashlar, 1290 Oakmead Parkway, Suite 218, Sunnyvale, CA 94086. (408) 746-2980. (May '90) ★'89 Eddy

Design Your Own Home: Architecture ⭐⭐⭐½

Design Your Own Home is a specialized drawing program that produces simple housing floor plans and elevations. Its built-in parts libraries and many sample plans (more are available separately) make the job easy. It's a decent drawing program. Requires Mac Plus or later. $99.95; additional design libraries, $29.95 each. Abracadata, P.O. Box 2440, Eugene, OR 97402. (503) 342-3030. (May '90)

DynaPerspective ⭐⭐⭐⭐

DynaPerspective is a good 3-D architectural-modeling program ported from DOS. Can create perspective drawings and elevations automatically from a floor plan. Objects can be made translucent, so windows and water effects are possible. It can also produce animations that "fly" you around buildings and in and out of rooms. Version 1.2. Requires Mac II or later. $1,495. Dynaware, 1163 Chess Drive, Suite J, Foster City, CA 94404. (415) 349-5700. (July '89)

MGMS: Professional CAD for Macintosh ⭐⭐⭐⭐

MGMS: Professional CAD for Macintosh offers more than 200 functions. Very complete, capable program. Groups, dimensions, and libraries are standard. Sometimes confusing — designed for experienced professional CAD users, not novices. Full plotter support. Version 2.5. Requires Mac 512K or later. Black-and-white, $999; color, $1,399. Micro CAD/CAM, 2335 Alaska Ave., El Segundo, CA 90245. (213) 536-9207. (Nov '87) ★'87 Eddy

MiniCAD+ ⭐⭐⭐⭐

MiniCAD+ separates itself from its competition by incorporating a Pascal-like macro language, 3-D graphics, and a spreadsheet. Has a MacDraw-like feel, but added features compete with Claris CAD. May have the best 3-D capabilities among low-cost CAD programs. Version 2.0. Requires Mac Plus or later, hard-disk drive, and System 6.0; 2 megabytes recommended. $695. Graphsoft, 8370 Court Ave., Suite 202, Ellicott City, MD 21043. (301) 461-9488. (Dec '89)

ModelShop ⭐⭐⭐½

ModelShop is a powerful 3-D modeling package. It needs many navigational and editing improvements to match its powerful feature set, however. Procedures not only differ from what you expect but often require too many steps. Version 1.0. Requires Mac Plus or later and a hard-disk drive. $595. Paracomp, 1725 Montgomery St., Second floor, San Francisco, CA 94111. (415) 956-4091. (Apr '90)

Precision ⭐⭐⭐

Precision is a 2.5-D CAD program with some quirks. The Cut and Paste functions operate oddly, and many things don't work as expected. The program is powerful but slow. It freezes and crashes at times. When these problems are cleaned up, it should be superb. Version 1.2. Requires Mac II or later or SE/30. $295. Innovative Systems, 171 Interstate Drive, West Springfield, MA 01089. (800) 222-1648 or (413) 737-3993. (Apr '90)

StrataVision 3d ⭐⭐⭐⭐

StrataVision 3d brings mainframe rendering power to the Mac, provided you have a lot of RAM and a lot of patience. It's a modeling and visualization tool that can create photorealistic 3-D images. Rendering is very slow — it can take hours. It can also be done in the background so you can do other work. Precision options are conspicuously lacking. Version 1.03. Requires Mac Plus or later. $495. Strata, Inc., 249 E. Tabernacle, Suite 201, St. George, UT 84770. (801) 628-5218. (May '90)

VersaCAD ⭐⭐⭐⭐

VersaCAD is a powerful CAD program that doesn't show any of its DOS roots. Excellent element manipulation, full plotter support. Library user interface is crude. Version 2.2. Requires Mac Plus or later. $1,995. Versacad, 2124 Main St., Huntington Beach, CA 92648. (714) 960-7720. (July '88) ★'88 Eddy

• CLIP ART

ArtClips ⭐⭐⭐

ArtClips is a peculiar collection of EPSF "artwork." Requires Mac Plus or later. First edition, $99; second edition, $129. Tactic Software, 11925 S.W. 128th St., Miami, FL 33186. (305) 378-4110. (Aug '89)

Artware Borders ⭐⭐⭐⭐

Artware Borders lets you customize your own clip-art disk. The border collection is the best package in terms of art quality. Other packages are available. Requires a program that reads EPSF files. $129.95; graphics pack, $149.95. Artware Systems, 6512 Six Forks Road, Suite 502A, Raleigh, NC 27615. (919) 870-9593. (Aug '88)

Click & Clip ⭐⭐⭐

Click & Clip offers seasonal graphics packages. Of the two quarterly editions released, the spring '88 package is the better collection. Requires a program that reads EPSF files. $39.95 per edition. Also available: C&C 500, $395; C&C Military Arts, $149; Road and Warning Signs, $99; Medical/Health, $149. Studio Advertising Art, 4305 E. Sahara, Suite 1, Las Vegas, NV 89104. (702) 641-7041. (Aug '88)

Clip3D ⭐⭐⭐⭐

Clip3D is a line of 3-D, color clip-art collections bundled with a powerful editing program. Images are in Pro3D format and provide exceptional output quality. On a Mac II, DAs don't work while Clip3D is active. Version 1.0. Requires Mac Plus or later. $99 per package, including Clip3D editor. Enabling Technologies, 600 S. Dearborn, Suite 1304, Chicago, IL 60605. (312) 427-0408. (Aug '89)

Cliptures ⭐⭐⭐⭐

Cliptures is a series of business-oriented EPSF clip-art packages. Volume 2, Business Images, is the best collection and can be cataloged with Curator. Requires Mac Plus or later. $129.95. Dream Maker Software, 7217 Foothill Blvd., Tujunga, CA 91041. (800) 876-5665 or (818) 353-2297. (Aug '89)

Collector's Edition I ⭐⭐⭐⭐

Collector's Edition contains a useful assortment of dingbats and borders and two editable alphabets, all saved in Illustrator format. Requires Mac Plus or later. $225. Adobe Systems, 1585 Charleston Road, P.O. Box 7900, Mountain View, CA 94039-7900. (800) 344-8335. (Aug '89)

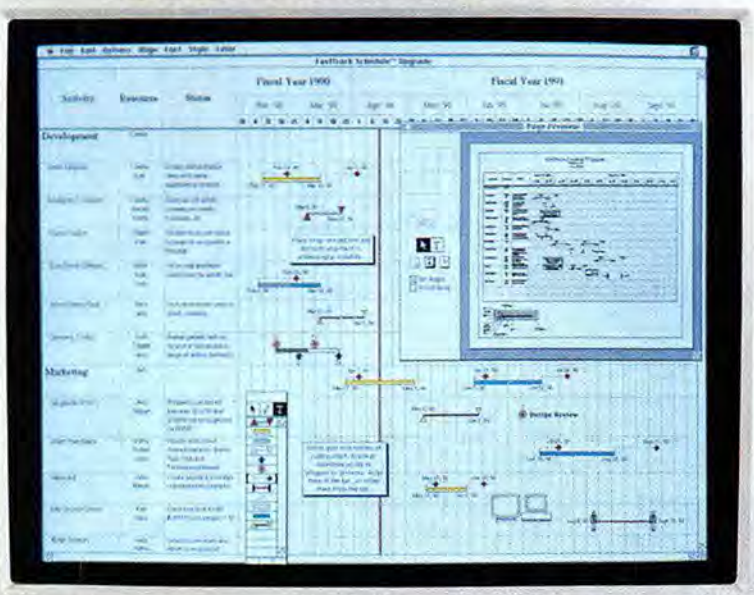
Comic People, Volume 2: Kids Stuff ⭐⭐⭐⭐

Comic People, Volume 2: Kids Stuff is a set of Comic Strip Factory add-ons that were drawn by Trici Venola and Kurt Wahlner. Extraordinary quality and range. Kids Stuff presents five children and two grown-ups of both sexes and various ethnic backgrounds. Also included are backgrounds, sound effects, a very spry cat, and some Little Extras. Best used from within Comic Strip Factory. $39.95. Foundation Publishing, 5100 Eden Ave., Edina, MN 55436. (612) 925-6027. (Aug. '90)

Digit-Art ⭐⭐⭐⭐⭐

Digit-Art is an overwhelming collection of EPSF clip art available on disk and on CD-ROM disc. Comes with a well-designed catalog of images. Requires a program that reads EPSF files. Twenty volumes are available. CD-ROM disc, $799; disk, $99 per volume. Image Club Graphics, 1902 11th St. S.E., Calgary, Alberta T2G 3G2, Canada. (800) 661-9410. (Aug '88)

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Now, with the power of Nisus 3.0's built-in word processing language you can convert mainframe files, index every word in a 400 page book, or even compute a trigonometric function

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The sample above shows fixed length fields and fixed length records that are common in some mainframe files. That means you can not simply tell your conversion program to drop in tab or comma delimited spaces at the end of the text in each field. For most programs converting this would be complete chaos. And that's without eliminating the duplications and extracting just the information you want.

Nisus 3.0's word processing language makes short work out of the formatting, extracting, and elimination process. Note the results below, including the bold face and upper and lower case changes. We are not suggesting you buy Nisus only for its ability to convert mainframe files, but with this kind of power, imagine what else you can do.

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A C Nielson Co	PO Box1297 30 S Main St	Fond Du Lac	WI

Most people believe that converting mainframe data into a format that you can use with a Macintosh is no trivial task. Companies spend thousands of dollars on the problem only to run into dead ends. Imagine their surprise when these companies learn that in less than half an hour, Nisus 3.0 can do for them what hundreds of thousands of dollars spent on equipment can not.

The power of Nisus not only lets you convert mainframe data, it lets you index every word in a document, and remove unwanted and nonessential words like "the, and, not, and of."

But the built-in word processing language isn't the only surprise in Nisus 3.0. It also has an integrated graphics capability that will let you do things that some layout programs can't such as rotate text, graphics, or even add arrows.

Nisus 3.0 has a robust list of features—but more important to you—benefits. Working with Nisus 3.0 is like discovering that a good friend has an increasing level of substance when put to the test.

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MiniFinders

Japanese Clip Art ★★★★½
Japanese Clip Art is extraordinary. Consists of MacPaint documents and separate fonts. Volume I, Heaven, covers mythological subjects; Volume II, Earth, has secular subject matter. $79.95 per volume; $149.95 per set. Also available: Year of the Dragon '88, $29.95; Borders Scroll, $99.95. Qualitas Trading, 6907 Norfolk Road, Berkeley, CA 94705. (415) 848-8080. (Apr '87)

MacGraphics ★★★
MacGraphics is a collection of bit-mapped clip art — 13 thematic disks containing 10 megabytes of art. Unfortunately, most pictures are full-page, and reproduction quality suffers when they are reduced. Version 3.0. $245. GoldMind Publishing, 12155 Magnolia Ave., Suite 3-B, Riverside, CA 92503. (714) 687-3815. (Jan '89)

Metro ImageBase Electronic Art ★★★½
Metro ImageBase Electronic Art is a series of TIFF clip art from the grandparent of the clip-art industry. The traditional looking images are huge, so have a large hard-disk drive handy. Requires Mac 512KE or later. $145. Metro ImageBase, 18623 Ventura Blvd., Suite 210, Tarzana, CA 91356. (800) 525-1552. (Aug '89)

Vivid Impressions ★★½
Vivid Impressions is cartoonish EPSF clip art, some of it in color. Special Events contains 130 images, many of them slightly altered duplicates. Requires Mac Plus or later. $130. Casady & Greene, P.O. Box 223779, Carmel, CA 93922. (408) 624-8716. (Aug '89)

WetPaint ★★★★★
WetPaint is a series of three-disk volumes of very high quality bit-mapped clip art. The program also includes the Art Roundup DA, a good art browser/editor. $79.95 per volume. Dubl-Click Software, 9316 Deering Ave., Chatsworth, CA 91311. (818) 700-9525. (Sept '87)

Works of Art Laser Art ★★★★
Works of Art Laser Art is a nice collection of business-oriented EPSF clip art. Version 1.0. Requires Mac Plus or later. $99.95. Spinnaker Software Corp., One Kendall Square, Cambridge, MA 02139. (800) 826-0706. (Aug '89)

• Drawing and Painting

Azimuth ★★★½
Azimuth is a solid map-making program that lets you build maps of the earth based on a viewpoint in space. The program produces excellent maps but has interface problems. Its selection of export formats is too limited, often rendering its nice output difficult to use. Version 1.0. Requires Mac Plus or later. $399. Graphsoft, 8370 Court Ave., Suite 202, Ellicott City, MD 21043. (301) 461-9488. (Apr '90)

Canvas 2.0 ★★★★★
Canvas 2.0 is a rich drawing/painting program, featuring full Bezier curves, the cutting and joining of polygons, skewing, perspective and distortion, auto-dimensioning, area and perimeter calculation, auto-tracing of bit maps, and full color support. Creates and edits high-resolution bit maps to 2,540 dpi. Slightly less powerful DA version available. Version 2.0. Requires Mac Plus or later and System 6.0 or later. $299. Deneba Software, 3305 N.W. 74th Ave., Miami, FL 33122. (305) 594-6965. (Apr '89) ★'89 Eddy

CA-Cricket Color Paint ★★★½
CA-Cricket Color Paint is an 8-bit-color painting program that retains Cricket Paint's FreshPaint feature and has only a few new tools. If you're looking for an 8-bit-color program, stick with Studio/8 or Canvas 2.0. Version 1.0. Requires Mac II or later, 2 megabytes, and System 6.0 or later. $295. Computer Associates, 10505 Sorrento Valley Road, San Diego, CA 92121-1698. (800) 531-5236. (Oct '89)

CA-Cricket Draw ★★★½
CA-Cricket Draw is an object-oriented drawing program that produces high-quality output. Designed to print on PostScript-compatible devices. Version 1.1.1. $295. Computer Associates, 10505 Sorrento Valley Road, San Diego, CA 92121-1698. (800) 531-5236. (May '87)

CA-Cricket Paint ★★★½
CA-Cricket Paint is a monochrome painting program with a few interesting tools but not enough to make it the first choice in its price range. FreshPaint gives it the best of both object-oriented and bit-mapped applications. Supports resolutions up to 300 dpi. Version 1.0. Requires Mac Plus or later and System 6.0 or later. $195. Computer Associates, 10505 Sorrento Valley Road, San Diego, CA 92121-1698. (800) 531-5236. (Oct '89)

The Comic Strip Factory ★★★★½
The Comic Strip Factory is an assembly program for creating comic strips. Includes a database of parts for various characters and backgrounds for panels. Good text editing in balloons. Can import and export in MacPaint format. Version 1.6. $69.95. Foundation Publishing, 5100 Eden Ave., Suite 307, Edina, MN 55436. (612) 925-6027. (Dec '87)

Crystal Paint ★★★
Crystal Paint creates an electronic kaleidoscope. It's MacPaint's Brush Mirrors gone wild in a small and simple yet wonderful application. Doesn't work in color on Mac II. Requires Mac 512K. $49.95. Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. (408) 438-1990. (Feb '88)

DeskPaint and DeskDraw ★★★★
DeskPaint and DeskDraw are a pair of DA graphics utilities. DeskPaint handles bit-mapped files, and DeskDraw handles PICT files. Very useful tools for desktop publishers. Somewhat busy interface due to be upgraded soon. DeskPaint, version 2.01C; DeskDraw, version 1.3. DeskPaint requires Mac 512K or later; DeskDraw requires System 5.0 or later. $129.95. Zedcor, 4500 E. Speedway, #22, Tucson, AZ 85712. (602) 881-8101. (Jan '90)

Drawing Table ★★½
Drawing Table is a low-priced alternative to MacDraw II that has some nice tools, but its clumsy selection interface makes it frustrating to use. Comes with separate libraries of object-oriented clip art, including arrows, landscaping, and chart symbols. Can import MacPaint, PICT, and EPSF art. Version 1.01. Requires Mac Plus or later and System 4.1 or later. $129. Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101. (415) 492-3200. (Nov '89)

FreeHand 2.0 ★★★★½
FreeHand 2.0 is a major upgrade. Greatly increased power includes up to 100 levels of undo, auto-trace, a Blend command for interpolating shapes and colors, and expanded text manipulation. Has a steep learning curve but is relatively easy to use once you've gotten the hang of it. Version 2.0. Requires Mac Plus or later. $495. Aldus, 411 First Ave. S., Seattle, WA 98104-2871. (206) 622-5500. (June '89)

Adobe Illustrator 88 ★★★★½
Adobe Illustrator 88 is a professional-level graphics program from the people who defined the PostScript language. Uses templates for precise drawing and detailed artwork. Version 1.8.3. Requires Mac Plus or later. $495. Adobe Systems, 1585 Charleston Road, P.O. Box 7900, Mountain View, CA 94039-7900. (800) 344-8335. (Oct '88) ★'88 Eddy

MacCalligraphy ★★★½
MacCalligraphy simulates brush painting. User-designed Seals and Touches enable you to design your own signature tool and the style of brush you use. Takes some getting used to. Version 2.01. $149.95. Qualitas Trading, 6907 Norfolk Road, Berkeley, CA 94705. (415) 848-8080. (Feb '88)

MacDraft ★★★★
MacDraft is an object-oriented graphics program. Has variable scaling, single-degree rotation, complex arcs, auto-dimensioning, and variable zoom/reduction. Version 1.2B. Requires Mac Plus or later. $269. Innovative Data Design, 2280 Bates Ave., Suite A, Concord, CA 94520. (415) 680-6818. (Feb '86)

MacDraw II ★★★½
MacDraw II updates the venerable object-oriented drawing program. Adds dithered and color patterns in its own documents but doesn't support color in PICT II format. Version 1.1v2. Requires Mac Plus. $395. Claris Corp., 5201 Patrick Henry Drive, Santa Clara, CA 95052. (408) 987-7000. (Nov '88)

MacPaint ★★★½
MacPaint hasn't lost its shine after all these years. Supports multiple windows, design templates, and a magic eraser for corrections. It lacks free-rotation and distortion talents. Version 2.0. Requires Mac 512K or later. $125. Claris Corp., 5201 Patrick Henry Drive, Santa Clara, CA 95052. (408) 987-7000. (July '88) ★'85, '87 Eddy

MapMaker ★★★★½
MapMaker is a digital cartographer that charts demographic and marketing information geographically. Wide variety of maps available — some at additional cost. Version 4.0. Requires Mac 512K or later. $395. Strategic Mapping, 4030 Moorpark Ave., Suite 250, San Jose, CA 95117. (408) 985-7400. (Dec '88)

Modern Artist 2.0 ★★½
Modern Artist 2.0 is still an interesting color painting program and has added a few new features, but there's not enough here to justify its substantial price increase. Requires Mac II. $395. Computer Friends, 14250 N.W. Science Park Drive, Portland, OR 97229. (503) 626-2291. (Feb '89)

Origins ★★★
Origins is a 2-D drafting and 3-D rendering program with lots of rough edges. Point-orientation method of drawing takes some getting used to. Both versions have very busy, nearly overwhelming screens with long menus and huge palettes. Version 2.0.5. Requires Mac Plus or later for monochrome, Mac II or later for color. Monochrome, $495; color, $595. Deltasoft, P.O. Box 55089, Tulsa, OK 74155-5089. (918) 250-5594. (Mar '90)

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MicroRX's main menu allows you to select your symptom by category. Suppose you have a damaged SE20, who's problem is a straight vertical line down the center of the screen with no picture. Selecting the Display option would bring you to...





...the Analog Board(AB) SubMenu. This is your gateway to Symptom Select, AB schematics, AB adjustments and the AB Sector key. By clicking the Symptom Select option, you can choose your symptom...

...by icon! The Symptom Select screen uses visual representations for different types of failures. These are labeled with descriptive titles to help detail your particular symptom. By choosing the Vertical Line symptom, you would then be taken to...

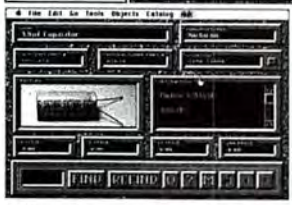




...the cure for the Vertical Line symptom. The text field explains several steps to follow in order to isolate the cause of the problem. In this case, you might find that component C15AB should be replaced. Clicking on the word *C15AB takes you to...

...the AB Sector Map MicroRX zooms into a close-view portion of the Analog Board and flashes C15AB several times to incicate it's location. Clicking the component's title within the Description Field would bring you to...





...the card within the MicroMat catalog containing info about C15AB. Listed are the description, specs, manuf. part number, MicroMat stock number and pricing. *In less than three minutes, we've learned that a $200 dollar repair is going to cost only $3 in parts!!!*

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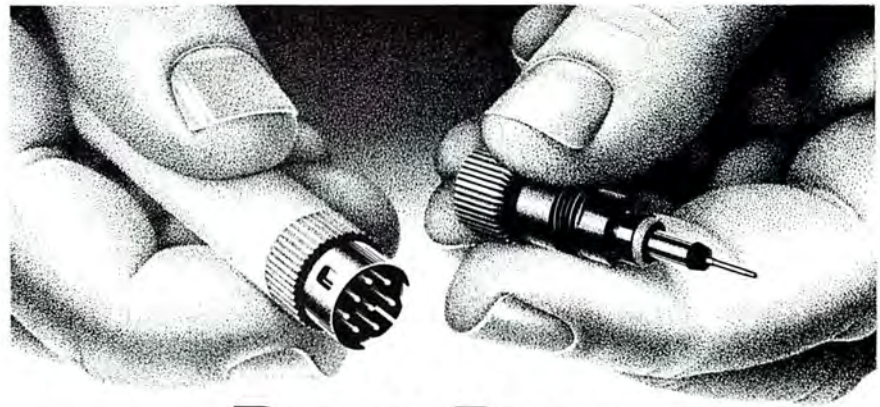
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Paradigm ‡‡‡½
Paradigm is a drawing program with a difference. It does relational drawing (and does it very well) in which each point's position depends on the location of other points — if you move a point, the rest of the drawing reacts correspondingly. Version 1.0. Requires Mac Plus or later. $120. Acuity, 2340-B Grant St., Berkeley, CA 94703. (415) 841-9533. (Mar '90)

Photon Paint ‡‡‡½
Photon Paint is not the equal of Studio/8 or PixelPaint, but it does offer a workable painting environment, multiwindow capability, some interesting special effects, and a lower price. Version 2.0. Requires Mac II with color card. $149.95. MicroIllusions, 110815 Zelzah, Granada Hills, CA 91394. (800) 522-2041 or (818) 360-3715. (May '89)

PixelPaint ‡‡‡‡‡
PixelPaint is a professional 256-color (8-bit) painting program with a good interface, practical tools, and special effects. Works with many file formats. Four-color separation capability is built in. Includes PixelScan utility for Sharp and Howtek color scanners that has excellent 8-bit imaging. Version 2.0. Requires Mac II or SE/30 with 8-bit-color board and 2 megabytes; hard-disk drive recommended. $595. SuperMac Technology, 485 Potrero Ave., Sunnyvale, CA 94403. (408) 245-2202. (Oct '89)

PixelPaint Professional ‡‡‡‡
PixelPaint Professional is the 32-bit descendant of the original PixelPaint. Interface sometimes hides the well-designed painting tools' capabilities. Supports four 256-color palettes per document. Includes several color-blending and -manipulating tools as well as anti-aliasing. Still has a few glitches but is a serious and necessary tool for electronic artists. Version 1.0. Requires Mac II series or SE/30; System 6.03 or later; hard-disk drive; 2 megabytes for 8-bit color, 4 megabytes for true color; 8-, 16-, 24-, or 32-bit video card; and color or gray-scale monitor. $699. SuperMac Technology, 485 Potrero Ave., Sunnyvale, CA 94086. (408) 245-2202. (Dec '89)

Studio/1 ‡‡‡‡½
Studio/1 is an excellent monochrome painting program that also has impressive flip-frame animation capabilities. You'll find an uncluttered animation surface, painting tools with 300-dpi capabilities, and a HyperCard playback utility (XCMD). Version 1.0. Requires Mac Plus or later. $149.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. (415) 572-2787. (Sept '89)

Studio/8 ‡‡‡‡‡
Studio/8 is a professional color (8-bit, or 256-color) painting application for the Mac II that has a superior tool set, an elegant interface, and excellent performance and speed. Version 1.1. Requires Mac II and hard-disk drive; 2 megabytes of RAM recommended. $495. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. (415) 572-2787. (Jan '89) ★'88 Eddy

Super 3D ‡‡‡‡
Super 3D is an update of an excellent 3-D object-oriented drawing program. Powerful features such as Sweep are easy to use. Can save your 3-D models in VersaCAD format. Version 2.04. Requires Mac Plus or later. $495. Silicon Beach Software, P.O. Box 261430, San Diego, CA 92126. (619) 695-6956. (Mar '90)

SuperPaint 2.0 ‡‡‡‡
SuperPaint 2.0 is the first upgrade of the original painting/drawing program. Some of the new features are plug-in tools, auto-trace, Bezier curves, support for resolutions exceeding 300 dpi, and eight-color support. A good program but not particularly fast. Version 2.0. Requires Mac Plus or later. $199. Silicon Beach Software, 9770 Carroll Center Road, San Diego, CA 92126. (619) 695-6956. (July '89)

Swivel 3D ‡‡‡‡‡
Swivel 3D quickly forms shaded solids in full color. Casts true shadows onto other objects and can project color graphics onto solids. Objects can be linked as jointed and sliding mechanisms that can be manipulated without accidental dismantling. It can tween-animate objects or fly your view through a scene, saving frames for playback. Superb object-manipulation interface. Version 1.1. Requires Mac Plus or later. $495. Paracomp, 1725 Montgomery St., Second floor, San Francisco, CA 94111. (415) 956-4091. (Mar '89) ★'89 Eddy

HARDWARE AND ACCESSORIES

CasioLink ‡‡‡‡½
CasioLink is a hardware and software package that links the popular Casio BOSS series of electronic organizers to a Macintosh. The cable is fine. The software is a bit limited and clunky, but it works. Can import and export to text files and HyperCard stacks (has some trouble importing from stacks). Version 1.0. Requires Mac Plus or later. $109.95. Traveling Software, 18702 N. Creek Parkway, Bothell, WA 98011. (800) 343-8080 or (206) 483-8088. (May '90)

The Ergotron Workstation ‡‡‡‡
The Ergotron Workstation is the best, most versatile computer workstation around. This freestanding or wall-mountable heavy steel unit includes a high shelf for your Mac II and a movable, damped arm for your monitor. The unit comes in a variety of configurations. $600 and up. Ergotron, 3450 Yankee Drive, Suite 100, Eagan, MN 55121. (800) 888-8458. (Mar '89)

Grappler LX ‡‡‡‡
Grappler LX hooks Macs up to parallel laser and 24-pin letter-quality printers. A cable, driver software, and special fonts combine to make dozens of once-unfriendly printers now compatible with the Mac. Requires Mac with 1 megabyte and a parallel printer. $199. Orange Micro, Inc., 1400 N. Lakeview Ave., Anaheim, CA 92807. (800) 223-8029 or (714) 779-2772. (Nov '88)

Macintosh Portable ‡‡‡‡
The Macintosh Portable is Apple's first portable. Considered by those who have never used one to be too big (it is), too heavy (16 pounds), too slow (68000 at 16 megahertz), and too expensive. Loved by all who have one or have used one for a while. A good beginning. $7,597 including modem, extra megabyte of RAM, and hard-disk drive. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (Mar '90) ★'89 Eddy

MacTable ‡‡‡‡‡
MacTable is an elegant Danish worktable that holds a Mac and printer with room to spare. The table, 30 inches deep by 58 inches wide, is made of particleboard and must be assembled. Cabinet is optional. Table, $339; cabinet, $149. ScanCo, P.O. Box 3217, Redmond, WA 98073-3217. (206) 481-5434. (Jun '90)

Madson Portable Case ‡‡‡‡‡
The Madson Portable Case is a soft case for the Mac Portable that lets you use your Portable without taking it out of the case. The only drawback is the lack of extra storage space. $90. The Madson Line, P.O. Box 338, Corte Madera, CA 94925. (415) 927-3600. (Sept '90)

The Portable Attache ‡‡‡‡
The Portable Attache is an attractive alternative to the Mac Portable case. Manufactured by Zero Halliburton, it's made of aluminum, is approximately the same size as the Mac Portable case, and comes with a handy accessory case (the perfect size for a Diconix printer) that fits inside. The file pocket in the Portable Attache detaches and becomes a portfolio. The Portable Attache is not suitable for checking on an airline, but the Portable Attache/Transport case (also available exclusively from EDC) is. $329.95; Portable Attache/Transport case, $369.95. EDC, 13101 Washington Blvd., Suite 110, Los Angeles, CA 90066. (213) 578-9712. (Sept '90)

StarController ‡‡‡‡½
The StarController distributes AppleTalk signals to devices on a network and provides some network-management and troubleshooting capabilities. It's very reliable, with excellent documentation and tech support. $1,295. Farallon Computing, 2000 Powell St., Emeryville, CA 94608. (415) 596-9000. (May '90)

Tefax RA2110M ‡‡‡
Tefax is a combination regular fax machine/fax modem. Although this sounds like the best of both worlds, it's not. The RA2110M lacks many necessary fax features such as a paper cutter, and the fax/modem software (a custom version of BackFax) isn't very good. Right now, buy a separate fax machine and a fax modem. $1,595. Relisys, 320 S. Milpitas Blvd., Milpitas, CA 95035. (408) 945-9000. (June '90)

TurboStar ‡‡‡½
The TurboStar distributes AppleTalk signals to devices on a network and provides some network-management and troubleshooting capabilities. Performance can be poor in certain wiring configurations. $1,795. Nuvotech, 2015 Bridgeway, Suite 204, Sausalito, CA 94965. (800) 232-9922 or (415) 331-7815. (May '90)

• DISPLAY SYSTEMS

Apple Portrait Display ‡‡‡‡‡
The Apple Portrait Display is a very high quality full-page monitor. It has a screen resolution slightly below true WYSIWYG, so things appear a bit small. Can produce up to 256 gray scales, using the new 8•24 cards. The cable is odd; make sure it fits your card. Requires Mac II or later. $1,698. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (Apr '90) ★'89 Eddy

AppleColor High-Resolution RGB ‡‡‡‡½
The AppleColor High-Resolution RGB monitor is standard among 13-inch monitors. It's very bright with no built-in glare protection. Can support 24-bit color when used with the Apple 8•24 and 8•24GC cards. Its 69-dpi screen resolution gives a slightly larger-than-WYSIWYG image. Very reliable workhorse. Requires Mac II or later. $1,647 (including

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video card). Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (May '90)

Color Display ★★★★★

The Color Display uses a 19-inch Sony Trinitron as its base. Depending on the board that is installed, 8- or 24-bit color is supported. The 82-dpi screen resolution isn't WYSIWG but does show two full 8.5-x-11-inch pages. Requires Mac II or later. $6,190 (with GS/C [8-bit] card). Radius, 1710 Fortune Drive, San Jose, CA 95131. (800) 227-2795 or (408) 434-1010. (May '90)

ColorPage T16 ★★★★★

The ColorPage T16 is consistently rated the best and brightest 8-bit color monitor by MacUser Labs. It's a razor-sharp Sony Trinitron, and the video card is also excellent. Requires Mac II or later. $4,495 (including video card). E-Machines, 9305 S.W. Gemini Drive, Beaverton, OR 97005. (503) 646-6699. (May '90)

MicroTV ★★★½

MicroTV is a NuBus board that puts a small (128-x-108 pixel) video image on-screen. If the input is good, performance is good. Best used for security and specialized applications (process control, for example) rather than TV watching. The control DA is elegant. Version 1.03. Requires Mac II or later. $395. Aapps, 756 N. Pastoria Ave., Sunnyvale, CA 94086. (408) 735-8550. (May '90)

Radius Full Page Display ★★★★

The Radius Full Page Display was the brightest monitor tested in a recent MacUser Labs report. The screen resolution is slightly below that of true WYSIWYG, so things appear a bit small. It can run in up to 256 gray scales. There's a slight flicker. Requires Mac Plus or later. $1,490. Radius, 1710 Fortune Drive, San Jose, CA 95131. (800) 227-2795 or (408) 434-1010. (Apr '90)

Radius Pivot ★★★★½

The Radius Pivot is a landscape/portrait monitor. A four-gray monitor, it's the same size as the Apple Portrait Display, only you can pivot the unit 90 degrees into either orientation. Radius' software and hardware perform a fast rotation of the pixels, and the window automatically expands to fill the new orientation. The only drawbacks are fuzziness around the edges, slight distortion of the display, and no glare protection. A good monitor on the brink of being great. $1,690. Radius, 1710 Fortune Drive, San Jose, CA 95131. (408) 434-1010. (Aug '90)

Radius Two Page Display ★★★★

Radius Two Page Display is a bright, well-focused 19-inch monochrome display system that comes with Radius' justly famous software, which includes tear-off menus and screen capture. Expensive compared with similar systems. $1,990. Radius, 1710 Fortune Drive, San Jose, CA 95131. (408) 434-1010. (Apr '90) ★ '88 Eddy

708+ Display ★★★★½

The 708+ Display uses a 19-inch Sony Trinitron as its base. It also has hardware pan, zoom, and virtual-desktop capability. It has a 72-dpi screen resolution for full WYSIWYG. Very highly rated by MacUser Labs. Requires Mac II or later. $5,790 with 8-bit video card. RasterOps, 2500 Walsh Ave., Santa Clara, CA 95051. (800) 468-7600 or (408) 562-4200. (May '90)

StarTime/VideoShow ★★

The StarTime/VideoShow is an expensive hardware-software combination for creating and showing color presentations. Lets you create color presentations with an SE. Then, using the VideoShow box and a monitor (including NTSC), you can play back your presentation without a Mac. Software is clunky and doesn't really take advantage of Mac graphics. Version 1.0. Requires Mac Plus or later, 20-megabyte hard-disk drive, VideoShow Model, color monitor, presentation software, and System 6.0 or later. $199; Model 260, $3,995; Model 280, $8.995; Model 280XD, $6,868 to $7,995. General Parametrics Corp., 1250 Ninth St., Berkeley, CA 94710. (800) 556-1234 or (415) 524-3950. (Nov '89)

TX ★★★★★

The TX uses the same physical monitor as the T16 but a higher-resolution video card. The 87-dpi screen resolution is good for CAD and freehand drawing, but it can make text hard to read unless the type size is increased. Requires Mac II or later. $3,595 (including video card). E-Machines, 9305 S.W. Gemini Drive, Beaverton, OR 97005. (503) 646-6699. (May '90)

• INPUT DEVICES

A+ Mouse ★★★★

The A+ Mouse uses infrared light reflected from a special pad to track mouse movement. No moving parts. Relative movement and clicking action feel similar to those of the standard Mac mouse. Non-ADB version, $99.95; ADB version, $129.95. MSC Technologies, 47505 Seabridge Drive, Fremont, CA 94538. (415) 656-1117. (Oct '89)

Apple Scanner ★★★½

The Apple Scanner is not the state of the art but is adequate for scanner neophytes. The 4-bit (16 gray level) scanner comes with AppleScan software and HyperScan, written by Bill Atkinson. Requires System 6.0 or later, hard-disk drive for full-page work, and SCSI connection cables. $1,799. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (Feb '89)

BitPad Plus ★★★½

The BitPad Plus offers basic drawing capabilities but no macro-making capability. Uses pens and pucks. Scaling of screen-to-pad ratio must be entered in pixels per inch. Must use MultiFinder to change settings while in an application. $495. SummaGraphics, 60 Silvermine Road, Seymour, CT 06483. (203) 881-5377. (Oct '89)

CalComp 2300A ★★★★½

The CalComp 2300A is a full-featured drawing tablet that lets you resize and reposition the drawing area. Three sizes, six different input devices (pens and pucks), and several software templates are available. AE Template Manager lets you perform all the System and HyperCard menu functions on the tablet. $595 to $2,495, depending on size. CalComp, 14555 N. 82nd St., Scottsdale, AZ 85260. (602) 948-6540. (Oct '89)

Felix ★★★½

Felix is a 5.75-inch-square optical-tracking mouse replacement. Space saver but awkward for lefties. It has a button on top of the pointer handle for mouse clicks. Drawing setting for absolute movement. Mac Plus and ADB versions available. $169. ALTRA Technology, 1200 Skyline Drive, Laramie, WY 82070. (800) 726-6153 or (307) 745-7538. (Oct '89)

Focus S800GS ★★★★

The Focus S800GS is a 400-dpi, 6-bit gray-scale scanner that simulates resolutions up to 800 dpi. It has superior resolution and good halftone quality. Professional-quality software has extensive editing features and printing options. $4,350; software, $495. Agfa Compugraphic, 200 Ballard Vale St., Wilmington, MA 01887. (508) 658-5600. (June '89) ★ '88 Eddy

FreeWheel Systems ★★★½

The FreeWheel Pointer determines the user's head position by bouncing infrared light off a small, lightweight mirror on the user's forehead. Compact receiver unit and puff switch (can be mounted wherever convenient). Standard keyboard arrangement on-screen. Mac II and SE versions, $1,395; ADB adapter, $150. Pointer Systems, One Mill St., Burlington, VT 05401. (802) 658-3260. (Oct '89)

HeadMaster ★★★½

The HeadMaster is designed for users with little or no use of their hands. It uses ultrasound signals emitted from a headset to determine the position of the user's head. Has a puff tube for the mouse button. Emulates all mouse functions. A variety of on-screen keyboards are available for typing. Available for Mac 512K, Plus, SE, and II. $900. Prentke Romich Co., 1022 Heyl Road, Wooster, OH 44691. (800) 262-1984 or (216) 262-1984. (Oct '89)

IS/ADB ★★★★

The IS/ADB is a tablet that comes in three sizes with a choice of seven pointing devices, including multibutton pucks and multibutton styli. Operates in either absolute or relative modes; active-area resizing on menu is handy for intensive drawing work. Twelve function keys, good for creating macros. $395 to $965. Kurta, 3007 E. Chambers St., Tempe, AZ 85040. (602) 276-5533. (Oct '89)

IS/ONE Tablet ★★★½

The IS/ONE Tablet with Penworks software lets you use a corded or cordless pen or mouse and a high-res tablet for precise graphics input. Minor bugs with some applications and DAs. Keystroke macros can be launched from the tablet. Minimal documentation. Requires Mac Plus or later. $525 to $995. Kurta, 3007 E. Chambers St., Tempe, AZ 85040. (602) 276-5533. (Jan '88)

LYNX Trackball ★★★½

The LYNX Trackball has an encased trackball. Small size makes it easy to control. Requires some wrist movement to access the buttons. Comes in both ADB and non-ADB versions. $99.95. Asher Engineering, 120 Linden Ave., Long Beach, CA 90802. (800) 321-5969 or (213) 590-9990. (Oct '89)

Mac 'N Touch ★★★★

Mac 'N Touch is a touch screen recommended for applications requiring a lot of pointing and clicking; works less well for programs such as graphics packages that require fine control. Available as an add-in screen for Mac SE and II models and as a snap-on screen for the SE only. Mac 'N Touch Add-In, $745 (SE), $895 (Mac II); Mac 'N Touch Snap-On, $595 (SE only). MicroTouch Systems, 55 Jonspin Road, Wilmington, MA 01887. (508) 694-9900. (Oct '89)

Mac 105 ADB Extended Keyboard ★★★½

The Mac 105 ADB Extended Keyboard is a good alternative to Apple's Extended Keyboard, with a larger Return key, larger and more-sculpted key tops, and a lower overall weight. Requires Mac SE or Mac II.



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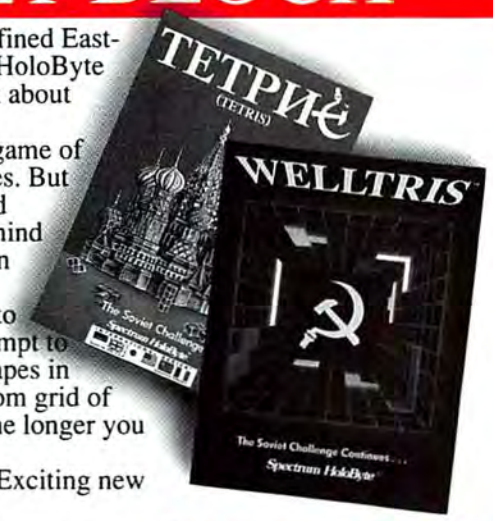
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$159; with QuicKeys, $189. Cutting Edge, P.O. Box 1259, Evanston, WY 82931-1259. (307) 789-0582. (Feb '89)

Mac-101 ★★★★

The Mac-101 is a keyboard alternative that has a good feel to it. Has a keypad, 15 function keys, and more. The 101-Keys DA lets you define macros. Also comes in an ADB version for the SE and II. Requires Mac 512K or later. $169.95. DataDesk International, 7651 Haskell Ave., Van Nuys, CA 91406. (818) 780-1674. (Apr '88)

Mach IV Plus ★★★½

The Mach IV Plus has buttons on either side of the stick and one atop the joystick. Can be used as a mouse emulator. Comes in ADB and non-ADB models. Also available is a peripheral called Mirage that adapts earlier non-ADB CH joysticks for ADB use. Mach IV, $89.95; Mirage, $54.95. CH Products, 970 Park Center Drive, Vista, CA 92083. (800) 624-5804 or (619) 598-2518. (Oct '89)

Macintizer ★★★

The Macintizer compares favorably with other tablets in terms of mouse emulation and drawing but lacks some software features. No built-in capability for using or creating overlay templates. Provides developer stacks for HyperTalk and Pascal. Active area resized through Control Panel. HyperCard-stack documentation. $499. GTCO, 7125 Riverwood Drive, Columbia, MD 21046. (301) 381-6688. (Oct '89)

MacTablet ★★★★

The MacTablet is a stylus-driven graphics tablet. Users can easily sketch or trace art using this absolute-positioning device. Has a working area the size of the Mac screen. Allows concurrent use of the mouse. $495. MacTablet Upgrade Kit available for $99.50. Summagraphics, 60 Silver Mine Road, Seymour, CT 06483. (203) 881-5400. (July '88)

MacTRAC ★★★½

The MacTRAC has three buttons — a lock and two clicks — located above the trackball. Equal ease of use for right- and left-handed people. Light signals that the lock button has been pushed. $99; ADB version, $119. MicroSpeed, 44000 Old Warm Springs Blvd., Fremont, CA 94538. (415) 490-1403. (Oct '89)

McIntyre ★★★½

The McIntyre is a joystick for people who can't use their hands. Can be mounted on a gooseneck stand. You manipulate the stick in your mouth to move the cursor while your tongue presses down on a button on top of the stick for clicking. An image of the keyboard appears on the bottom of the screen. Users can select letters and carry out most keyboard functions. Extremely sensitive. $350. McIntyre Computer Systems, 22809 Shagbark, Birmingham, MI 48010. (313) 645-5090. (Oct '89)

MouseStick ★★★★½

The MouseStick is useful where precise definition of movement is needed. The joystick has programmable settings; buttons can be programmed to carry out mouse-type functions or execute keyboard commands with single-, double-, or triple-clicking. $129.95. Advanced Gravis Computer Technology, 7033 Antrim Ave., Burnaby, British Columbia V5J 4M5, Canada. (800) 663-8558 or (604) 434-7274. (Oct '89)

MouseTouch ★★★★

The MouseTouch is a touch screen for selecting screens, pulling down menus, and entering numeric information via an on-screen keypad. Can be installed by the user. $1,060. Information Strategies, 888 S. Greenville Ave., Suite 121, Richardson, TX 75081. (214) 234-0176. (Oct '89)

PC Scan 2000 ★★★★½

The PC Scan 2000 is an 8-bit scanner that saves images in up to 256 levels of gray. Can be configured for IBM PCs. Requires 1 megabyte. Scanner, $1,395; Publish Pac software, $395; OCR text-processor card, $795. New Dest, 1015 E. Brokaw Road, San Jose, CA 95131. (408) 436-2700. (Dec '88)

ProPoint ★★★½

The ProPoint has a click button and a small lock button on the lower left side of the trackball casing. Left-handed people may have to take their fingers off the ball to press the buttons. $140. Abaton Technology, 48431 Milmont Drive, Fremont, CA 94538. (415) 683-2226. (Oct '89)

PW10SL ★★★★½

The PW10SL is a drawing tablet that offers friendly software setup and easy macro programming. Basic system menu commands, a mousing area, software controls, a macro pad, and a small keyboard appear along one side. Click-and-drag scaling and moving of the drawing area. $799. Personal Writer, 1900 Avenue of the Stars, Suite 2817, Los Angeles, CA 90067. (800) 322-4744 or (213) 556-1001. (Oct '89)

ThunderScan ★★★★

The ThunderScan was the original Mac scanner. It still does the job, albeit very slowly. Can scan only materials that can be fed through the printer (it replaces the ribbon cartridge). Excellent software. Version 5.1. Requires Mac Plus or later and ImageWriter or ImageWriter II. $249. Thunderware, 21 Orinda Way, Orinda, CA 94563. (415) 254-6581. (Mar '90)

Turbo Mouse ADB ★★★★★

The Turbo Mouse ADB is a trackball that is a favorite mouse replacement. Mousing and locking functions can be reversed for left-handed people. Has a "chording" feature for a user-specified keyboard-command-equivalent function. $169.95. Kensington Microware Ltd., 251 Park Ave. S., New York, NY 10010. (800) 535-4242 or (212) 475-5200. (Oct '89)

Wacom SD-510 Cordless Digitizer ★★★★★

The SD-510 Cordless Digitizer is light and very thin. It uses a pressure-sensitive stylus that requires neither a cord nor a battery. The tablet connects to the modem port. Its sensing area is 6 x 9 inches (overall size is roughly 10 x 13 inches). The resolution is 770 lpi (lines per inch) at high accuracy. It's much more responsive than a mouse. When not in use, it makes an excellent mouse pad. $495. Wacom, W. 115 Century Road, Paramus, NJ 07652. (201) 265-4226. (June '90)

Wrist Mac ★★★★½

The Wrist Mac is a small watch that hooks to your Mac. You can download and retrieve up to 80 screens of 12 characters each. Options allow two-way communications. Versions with straps are available. And it's a decent watch. Version 1.2. Requires Mac Plus or later and HyperCard. $260. Microseeds, 7030-B W. Hillsborough Ave., Tampa, FL 33634. (813) 882-8635. (Dec '89)

• OUTPUT DEVICES

ColorPro Plotter ★★★

The ColorPro Plotter is an eight-pen desktop plotter that requires third-party software to drive it. Fonts are limited to an optional Graphics Enhancement Cartridge that requires some BASIC programming. $1,295. Hewlett-Packard, 19310 Pruneridge Ave., Cupertino, CA 95014. (800) 752-0900. (Feb '88)

ColorQuick ★★★★

The ColorQuick is a QuickDraw printer that has reasonable (216 dpi) quality and produces vivid colors. The color range is excellent. It's fast and offers hand, roll, and cut-sheet paper feeds. $2,345. Tektronix Graphics Printing Division, Wilsonville, OR 97070. (800) 835-6100. (May '90)

CrystalPrint Publisher ★★★★½

The CrystalPrint Publisher is the first 300-dpi PostScript-clone printer. Based on a RISC microprocessor, it's faster and cheaper than the LaserWriter IINT. While output quality is excellent, it can't handle Adobe fonts. No manual feed or envelope capabilities. $4,499. Qume Corp., 500 Yosemite Drive, Milpitas, CA 95035. (800) 223-2479 or (408) 942-4000. (Sept '89) ★'88 Eddy

DeskWriter ★★★★★

The DeskWriter is HP's Mac-only version of the DeskJet inkjet printer, which swept the DOS world. Now built-in AppleTalk makes it more versatile. Although it can't do overheads and the ink can smear, its speed is excellent and text quality is equal to that of any 300-dpi laser printer. Uses QuickDraw, not PostScript, for graphics. Requires special fonts. Driver version A.02.00. $1,195. Hewlett-Packard, 19310 Pruneridge Ave., Cupertino, CA 95014. (800) 752-0900 or (800) 387-3867 (Canada). (Apr '90)

Diconix M150 Plus Printer ★★★★

Diconix M150 Plus Printer is the latest version of the tiny inkjet printer that GCC Technologies ships as the WriteMove. It can run on batteries or AC and easily fits in a briefcase. Comes with ATM. A good choice if you're on the road. $699. Eastman Kodak Co., PPP Customer Information Center, 901 Elm Grove Road, Rochester, NY 14653-6224. (800) 344-0006. (Sept '90)

ImageMaker Plus ★★★★

ImageMaker Plus shoots 35mm color slides directly from the Mac. Supports most presentation software. Uses patterns to represent colors. Requires Mac 512K or later. $1,995; Mac-Driver software, $149; font cartridge, $195; one-year warranty, $320. Presentation Technologies, 743 N. Pastoria Ave., Sunnyvale, CA 94086. (408) 749-1959. (Feb '88)

ImageWriter LQ ★★½

The ImageWriter LQ outputs letter-quality text and graphics at 216 dpi. To do so, it reduces 72-dpi screen fonts to a third of their actual size. Takes a lot of memory. Printer driver, version 2.0. Requires 1 megabyte and large font sizes. $1,400. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (Jan '89)

LabelWriter ★★★★

The LabelWriter is a small serial printer that thermally prints labels individually. Labels can include bar codes but can't mix text and graphics. The interface needs some work, and a Chooser-selectable driver is promised for future versions. This is an addicting and time-saving device. Comes with two Casady & Greene fonts. Requires Mac Plus or later. $249.95. CoStar, 22 Bridge St., Greenwich, CT 06830. (800) 426-7827 or (203) 661-9700. (May '90)

LaserWriter IINT ‡‡‡
The LaserWriter IINT is Apple's midpriced PostScript laser printer. It's faster than the LaserWriter Plus, with blacker blacks. Gray scale is less even than that of Plus. Requires Mac 512K or later. $4,499. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (May '88)

LaserWriter IINTX ‡‡‡‡½
The LaserWriter IINTX is Apple's top-of-the-line PostScript laser printer. The 68020 chip makes it very speedy; expandable to 12 megabytes; SCSI hard-disk drive can be attached for fonts. Requires Mac 512K or later. $5,999. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (May '88)

LaserWriter IISC ‡‡‡
The LaserWriter IISC is Apple's low-end QuickDraw laser printer. Can be upgraded to IINT or IINTX; reasonably fast. Requires Mac Plus or later. $2,799. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (May '88)

MacDot-LQ ‡½
The MacDot-LQ is a 24-pin dot-matrix printer that emulates the ImageWriter LQ. It uses the LQ driver for compatibility, but it's not networkable and costs nearly $200 more. Bug-ridden emulation often loses touch with your Mac. Requires ImageWriter II or LQ drivers' jumbo fonts for 216-dpi printing. $1,395. Advanced Matrix Technology, 765 Flynn Road, Camarillo, CA 93012. (800) 992-2264. (Aug '89)

PaintJet XL ‡‡‡½
The PaintJet XL has low-resolution QuickDraw (180-dpi) quality but produces good-looking output. Not all colors can be reproduced. It's fast. Paper handling is good, and it can print B-size sheets. $2,495. Hewlett-Packard, 19310 Pruneridge Ave., Cupertino, CA 95014. (800) 752-0900. (May '90)

PLP II ‡‡‡‡‡
The PLP II is a bargain-priced 300-dpi QuickDraw laser printer. Excellent printing performance, although a bit slow. No PostScript support. Requires Mac Plus or later. $1,399. GCC Technologies, 580 Winter St., Waltham, MA 02154. (617) 890-0880. (Mar '90) ★'89 Eddy

QMS Colorscript 100 ‡‡‡‡
QMS Colorscript 100 is the first color PostScript printer that uses a four-color thermal wax-transfer technology. Works on AppleTalk. Excellent typographic capability. Currently supports only a handful of applications. Requires Mac Plus or later. $21,995; Model 30, $15,995; Model 10, $9,995. QMS Electronic Publishing Group, One Magnum Pass, Mobile, AL 36689. (205) 633-4500. (Oct '88) ★'89 Eddy

QMS-PS 820 turbo ‡‡‡‡
The QMS-PS 820 turbo is a good substitute for the LaserWriter NTX. It is slightly faster and slightly cheaper than the NTX. It also has two paper trays, each capable of holding 200 sheets. The 820 uses a Canon TX engine. A hard-disk drive can be attached for fonts. $6,995. QMS Electronic Publishing Group, One Magnum Pass, Mobile, AL 36689. (800) 631-2692, ext. 420. (May '90)

QMS-PS810 ‡‡‡½
The QMS-PS810 is an eight-page-per-minute 300-dpi PostScript laser printer that competes with the LaserWriter IINT. Comes with 2 megabytes of RAM standard; upgradable to 3 megabytes. Emulates HP LaserJet, 7475 (HPGL), and Diablo 630. $4,995. QMS Electronic Publishing Group, 7852 Schillinger Park W., Mobile, AL 36608. (800) 523-2696. (July '88)

Smart Label Printer ‡‡‡‡
The Smart Label Printer is a small serial printer that thermally prints labels one at a time. Labels can include bar codes but can't mix text and graphics. The interface needs some work. Requires Mac Plus or later. $249.95. Seiko Instruments USA, PC Products Div., 1144 Ringwood Court, San Jose, CA 95131. (800) 888-0817, ext. 104R, or (408) 922-5900. (May '90)

Tektronix 4693D Color Image Printer ‡‡‡‡
The Tektronix 4693D Color Image Printer is a 300-dpi bit-mapped color printer. Colors look smooth and rich. Uses bit-mapped screen fonts; most type has noticeable jaggies. Requires Mac II with color monitor. Recommended 8-megabyte configuration, $8,995. Tektronix, P.O. Box 1000, MS-63583, Wilsonville, OR 97077. (800) 835-6100. (Oct '88)

WriteImpact ‡‡‡‡
The WriteImpact is a near-letter-quality dot-matrix printer. It has 25-to-400 percent enlargement and reduction, print preview, smoothing, and kerning features. It uses special Bitstream fonts that tend to be large but also works well with ATM. Performance is very good — equaling that of the ImageWriter LQ without the problems and the high price tag. $699. GCC Technologies, 580 Winter St., Waltham, MA 02154. (617) 890-0880. (June '90)

WriteMove ‡‡‡
The WriteMove is one of the smallest, lightest Mac printers. It's an inkjet unit that can produce resolutions of up to 192 dpi. It can run off rechargeable batteries or AC and weighs just 3 pounds. It comes with a good selection of Bitstream fonts. Printing quality varies widely, depending on the paper and ink used. Printer driver, version 1.0. Requires Mac Plus or later and hard-disk drive. $599. GCC Technologies, 580 Winter St., Waltham, MA 02154. (617) 890-0880. (Apr '89)

• PERFORMANCE ENHANCERS

Fast Cache IIci ‡‡‡‡½
The Fast Cache IIci is a card that fits the IIci Processor Direct slot. It has 64K of 25-nanosecond static RAM that increases the IIci's performance between 5 and 40 percent. (4D is worst; Excel recalcs are best). Requires Mac IIci. $995. DayStar Digital, 5556 Atlanta Highway, Flowery Branch, GA 30542. (800) 962-2077, (404) 967-2077. (May '90)

MaraThon Racer ‡‡‡‡
The MaraThon Racer is a cheap way to get more performance from a Mac II. It supplies a cache of 32K of high-speed static RAM that increases performance an average of 15 percent. Excel spreadsheet recalcs speed up about 20 percent, but 4D sorts don't show much improvement. Most applications fall between those extremes. The Racer can be somewhat difficult to install. Requires Mac II. $259. Dove Computer, 1200 N. 23rd St., Wilmington, NC 28405. (800) 622-7627 or (919) 763-9718. (May '90)

Radius Accelerator 25 ‡‡‡‡‡
The Radius Accelerator 25 can make your Mac SE run 50 percent faster than a Mac II. The add-in accelerator card has a Motorola 68020 CPU that runs at 25 megahertz and an optional 25-megahertz 68882 math coprocessor. $1,395; with optional 25-megahertz 68881, $1,895. Radius, Inc., 1710 Fortune Drive, San Jose, CA 95131. (800) 227-2790 or (408) 434-1011. (Oct '88)

Radius QuickCAD Graphics Engine ‡‡‡‡
The Radius QuickCAD Graphics Engine is a NuBus card for accelerating screen-redraw speed in CAD applications that use display-list technology. Currently only AutoCAD and VersaCAD do so, but Vellum 1.1 will be modified to support QuickCAD as well. With Radius monitors and video cards, QuickCAD can also accelerate standard QuickDraw graphics. Redraw speed can increase by 10 to 30 times over that of a standard Mac II. $1,495. Radius, 1710 Fortune Drive, San Jose, CA 95131. (408) 434-1010. (Aug '90)

SpeedCard ‡‡‡‡½
The SpeedCard is an accelerator board for the Mac SE that more than doubles the speed of most applications. The board uses the 68000 chip in the SE and an optional floating-point 68881 chip for number crunching. Requires Mac SE. $399; with coprocessor, $699. SuperMac Technology, 485 Potrero Ave., Sunnyvale, CA 94086. (408) 245-2202. (Nov '88)

• STORAGE MEDIA AND MEMORY

AppleCD SC ‡‡‡‡
The AppleCD SC reads CD-ROM optical discs that contain up to 656 megabytes of data. Also plays audio compact discs. Reads High Sierra (an industry standard for CD-ROM) and Mac formats. $899. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (Dec '88)

Cirrus 84 ‡‡‡‡½
The Cirrus 84 is a sleek, quiet 84-megabyte hard-disk drive. Has a five-year warranty. It comes with SilverLining formatting and utility software. There are no physical activity indicators, but there is a software indicator in the corner of the screen. Requires Mac Plus or later. $959. La Cie, 16285 S.W. 85th, Suite 306, Tigard, OR 97224. (800) 999-0143 or (503) 684-0143. (Feb '90)

DataFrame XP60 ‡‡‡‡½
The DataFrame XP60 is a solidly built 60-megabyte hard-disk drive designed to sit next to the Mac. It's bundled with some of the best software in the business, including DiskFit, SuperLaserSpool, and SuperSpool. It tends to run noisily and has internal termination. It's also a bit expensive in this class. Requires Mac Plus or later. $1,199. SuperMac Technology, 485 Potrero Ave., Sunnyvale, CA 94086. (408) 245-2202. (Feb '90)

DataPak ‡‡‡‡
The DataPak is a 45-megabyte removable Winchester hard-disk drive. Great for backing up your main hard-disk drive or transporting large amounts of data between office and home. Requires SCSI connector and System 4.1 or later. Drive, $1,799.95; cartridges, $179.95 each. MASS Microsystems, 550 Del Rey Ave., Sunnyvale, CA 94086. (800) 552-7979. (Jan '89)

Ehman 60 ‡‡‡
The Ehman 60 is cheap. That's the best reason to buy this 60-megabyte hard-disk drive. It runs cool and has a fine manual and two-year warranty. On the other hand, it is relatively slow and noisy. Requires Mac Plus or later. $579. Ehman, P.O. Box 2126, Evanston, WY 82931-1259. (800) 257-1666 or (307) 789-3830. (Feb '90)

FX/20 ‡‡‡‡
The FX/20 is a good 20-megabyte external hard-disk drive.

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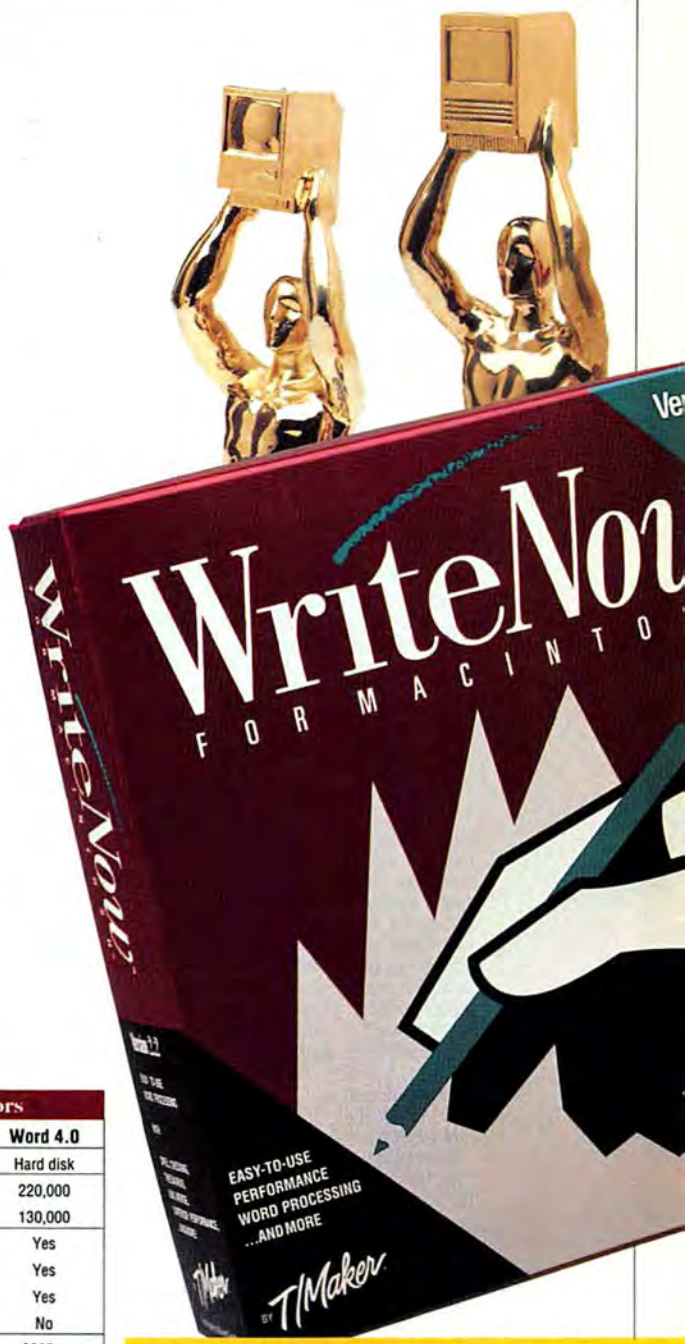
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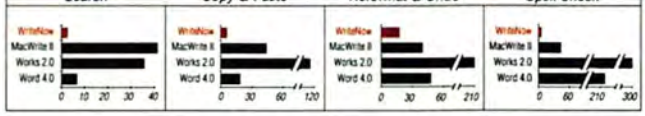
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Spell Checker *(Size in words)*:	135,000	100,000	60,000	130,000
Mail Merge:	Yes	Yes	Yes	Yes
Format Accelerators:	Yes	Limited	No	Yes
Mulitple Header/Footers:	Yes	No	No	Yes
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Speed Comparison Charts *(in seconds)*



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Good utility software. Reliable and reasonably quiet. Sits next to the Mac and has a large oddly shaped case. Requires Mac 512K, SCSI port, and new ROM. $649. GCC Technologies, Inc., 580 Winter St., Waltham, MA 02154. (617) 890-0880. (Feb '87)

Hard Disk 80SC ⭐⭐⭐⭐½

The Hard Disk 80SC is a superbly designed and well-built 80-megabyte unit. You do pay for the Apple logo, however. Early examples had quality problems, but the current run is fine. These units are noisy and tend to run warm. Requires Mac Plus or later. $1,799. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (Feb '90)

Hard Disk 20SC ⭐⭐⭐⭐

The Hard Disk 20SC is Apple's 20-megabyte SCSI hard-disk drive. Reliable, fairly noisy unit. Good utility software but no backup yet. Requires SCSI port, 512K or later, and new ROM. $899. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (Feb '87)

HD1040 ⭐⭐⭐⭐½

The HD1040 is a very fast zero-footprint 40-megabyte hard-disk drive. It features a two-year warranty, a thumb-wheel switch for setting the SCSI ID, and automatic head parking. Requires Mac Plus or later. $839. Heart Data Corp., 9009 Independence Ave., Canoga Park, CA 91304. (800) 999-8133 or (818) 998-1691. (Feb '90)

MacCrate 60 ⭐⭐⭐

The MacCrate 60 is a well-built zero-footprint 60-megabyte hard-disk drive. It has automatic head parking and sports a push-button switch for setting the SCSI ID. It tends to run warm because of a badly placed fan and has internal termination, which is a drawback. Requires Mac Plus or later. $839. Crate Technology, 6850 Vineland Ave., North Hollywood, CA 91605. (800) 543-5808 (national) or (800) 766-4001 (CA). (Feb '90)

MacBottom HD-70 Hard Disk ⭐⭐⭐⭐½

The MacBottom HD-70 Hard Disk is an excellent drive that comes with some very good software, including HFS Backup. $679; 1,200-bps Hayes-compatible modem, $100 extra. Personal Computer Peripherals Corp. (PCPC), 4710 Eisenhower Blvd., Building A-4, Suite 4, Tampa, FL 33634. (800) 622-2888. (Apr '89)

MacinStor 90 ⭐⭐⭐⭐½

The MacinStor 90 is an expensive, expandable 90-megabyte unit (another 3.5-inch drive can just be dropped in — the power supply and wiring are already there). This cool and fast drive features a zero footprint, rotary switch for SCSI ID, and external termination. Its main drawback is that it's relatively slow. Requires Mac Plus or later. $1,749. Storage Dimensions, 2145 Hamilton Ave., San Jose, CA 95125. (408) 879-0300. (Feb '90) ★'89 Eddy

MacSnap Plus 2 ⭐⭐⭐⭐

The MacSnap Plus 2 is a 2-megabyte memory upgrade for the Mac Plus. The board has 256-kilobit chips. User installable. Not compatible with existing big screens or internal hard-disk drives and can't be expanded further. $299. Dove Computer, 1200 N. 23rd St., Wilmington, NC 28405. (800) 622-7627. (June '87)

MagicDrive 91 ⭐⭐⭐⭐

The MagicDrive 91 is very reasonably priced. It employs an excellent 90-megabyte mechanism and is very fast. This zero-footprint unit comes with approximately 10 megabytes of public-domain and shareware software. The SCSI ID is software-controlled — a drawback. The test unit ran warm. Requires Mac Plus or later. $950. MacProducts USA, 8033 Mopac Expressway, #218, Austin, TX 78759. (800) 622-3475 or (512) 343-9441. (Feb '90)

Micro/IIi-620 ⭐⭐⭐⭐½

The Micro/IIi-620 is a fast 600-megabyte internal hard-disk drive for the Mac II. The drive is a repackaged Impremis Wren V (Control Data). Average access time is 16 milliseconds. Requires Mac II with low-profile SIMMs. $4,195. MicroNet Technology, 20 Mason, Irvine, CA 92718. (714) 837-6033. (Aug '89)

Mirror M20 ⭐⭐⭐⭐

The Mirror M20 is an inexpensive zero-footprint 20-megabyte drive that is somewhat marred by marginal workmanship. Another drawback is its internal termination. Good points are its noise filter, switched outlet, good manual, and good setup software. Requires Mac Plus or later. $447. Mirror, 2644 Patton Road, Roseville, MN 55113. (800) 654-5294 or (612) 633-2105. (Feb '90)

MS62 ⭐⭐⭐⭐½

MicroNet's MS62 is a very fast, well-constructed zero-footprint 60-megabyte hard-disk drive. The price is competitive, and MicroNet has an excellent record of supporting its products. Requires Mac Plus or later. $1,095. MicroNet Technology, 20 Mason, Irvine, CA 92718. (714) 837-6033. (May '90)

MS30 ⭐⭐⭐⭐

The MS30 is a well-constructed zero-footprint 30-megabyte hard-disk drive. The SCSI ID is set via a DIP switch, not the best solution these days. The price is very competitive, and the manufacturer has an excellent record of standing behind its products. Requires Mac Plus or later. $845. MicroNet Technology, 20 Mason, Irvine, CA 92718. (714) 837-6033. (Feb '90)

NEC CDR-35 CD-ROM Drive ⭐⭐½

The NEC CDR-35 CD-ROM Drive is a portable CD-ROM drive that can also double as a portable CD player. Unfortunately it has many flaws, such as only one SCSI connector, no way of changing the SCSI address, and almost nonexistent documentation, and you can't even manually stop the drive to remove a CD after a system crash. Look at the Toshiba portable CD-ROM drives instead. $599. NEC Technologies, 1255 Michael Drive, Wood Dale, IL 60191-1094; (708) 860-9500. (Sept '90)

Nova 40 ⭐⭐⭐⭐⭐

The Nova 40 is a nice zero-footprint 40-megabyte unit. It has a plastic case, five-year warranty, automatic head parking, and other features expected with a top-line unit. Requires Mac Plus or later. $649. Microtech International, 158 Commerce St., East Haven, CT 06512. (800) 325-1895 or (203) 468-6223. (Feb '90)

Preference 20 ⭐⭐⭐⭐

The Preference 20 is a strongly built but relatively slow 20-megabyte hard-disk drive. The plastic case actually has a steel subchassis. One drawback is the lack of automatic head parking. Requires Mac Plus or later. $699. Western Digital, 2445 McCabe Way, Irvine, CA 92714. (800) 331-8127 or (714) 474-2033. (Feb '90)

Pro 20 ⭐⭐⭐½

The Pro 20 is a small low-priced 20-megabyte unit. It's very quiet as there's no fan, which also means it runs warm. Nice features and lots of software included. Two-year warranty. Requires Mac Plus or later. $695. iDS, Koll Bayshore Building, 2107 N. First St., Suite 280, San Jose, CA 95131. (800) 733-0078. (Feb '90)

Quantum 80 ⭐⭐⭐⭐

The Quantum 80 is a fine 80-megabyte drive at a rock-bottom price. It's fast, quiet, and runs cool. The heads park automatically, and SCSI ID selection is by push-button switch. One drawback is its internal termination. The manual is very skimpy. Requires Mac Plus or later. $849. Mac Land, 5006 S. Ash Ave., Tempe, AZ 85282. (800) 333-3353 or (602) 820-5802. (Feb '90)

SA6000 30 ⭐⭐⭐

SA6000 30 is the Volkswagen of hard-disk drives. The construction of this 30-megabyte unit doesn't look nice, but everything works. The manuals are photocopies. The internal termination is also a drawback. Requires Mac Plus or later. $529. Stock Drives, 1977 O'Toole Ave., B206, San Jose, CA 95131. (408) 954-1227. (Feb '90)

SD140U External SCSI Hard Disk Subsystem ⭐⭐⭐⭐⭐

The SD140U External SCSI Hard Disk Subsystem is a very fast, high-capacity SCSI hard-disk drive with a unity interleave and an average access time of 18 milliseconds. Holds 140 megabytes. Help, file-transfer, and tape-backup commands built in. Hard Disk Partition is a useful DA. Comes with a 6-foot SCSI cable. $2,095. CMS Enhancements, 1372 Valencia Ave., Tustin, CA 92680. (714) 259-9555. (July '87)

Server 90 ⭐⭐⭐⭐⭐

The Server 90 is a well-made, fast, and cool zero-footprint 90-megabyte drive. Features include push-button SCSI ID setting, automatic head parking, and external termination. It is a bit noisy, and the manual is bare. Requires Mac Plus or later. $1,595. Deltaic, 1977 O'Toole Ave., B206, San Jose, CA 95131. (408) 954-1055. (Feb '90)

SiliconDisk ⭐⭐⭐⭐½

The SiliconDisk is a large, very high performance dedicated RAM disk that runs 300 times faster than a typical hard-disk drive. Software overhead keeps actual performance improvements to about 2.5 times normal. This pricey but powerful unit is easy to hook up and use. Requires Mac Plus or later. $11,995. ATTO Technology, 1567 Sweet Home Road, Amherst, NY 14221. (716) 688-4259. (Feb '90)

UltraDrive 30 ⭐⭐⭐⭐½

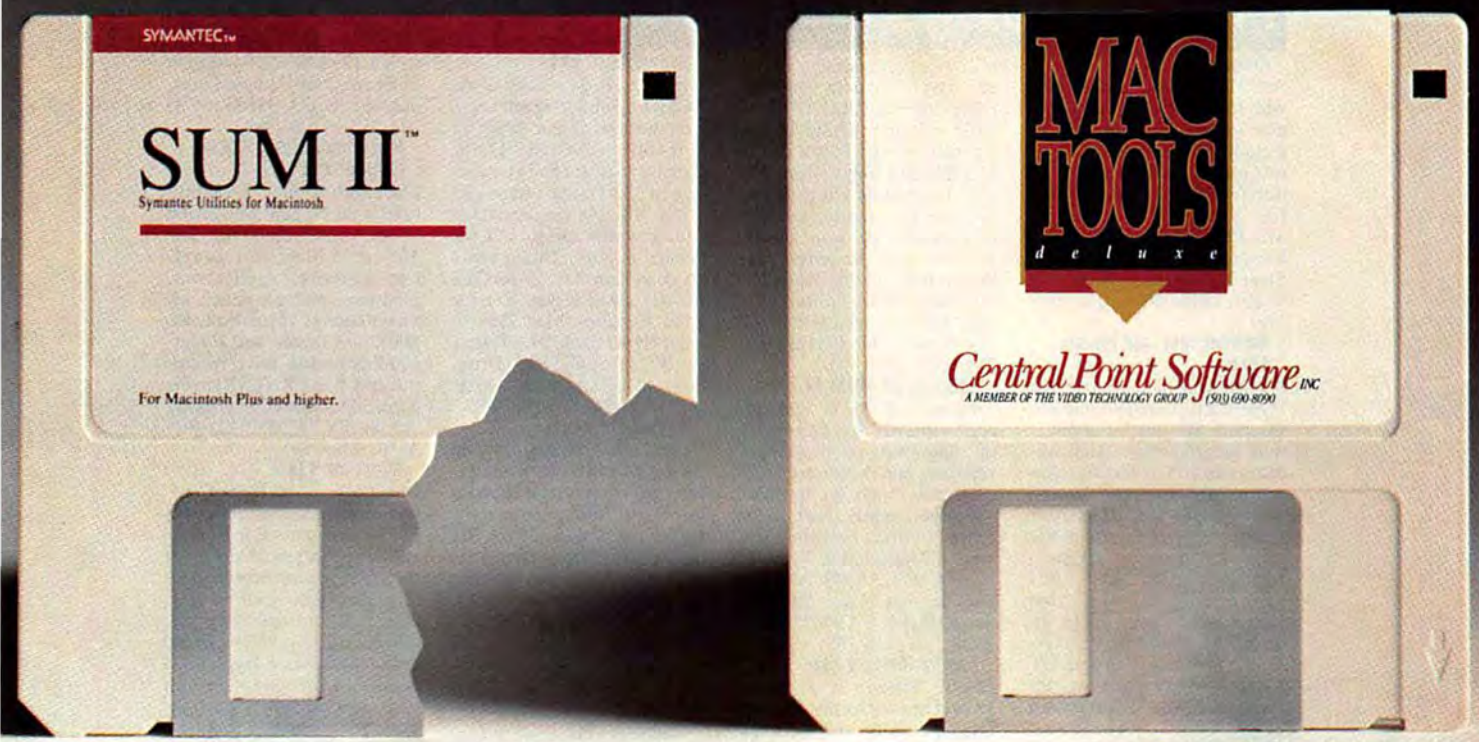
The UltraDrive 30 comes with lots of good and useful software as well as an unusually informative manual. This 30-megabyte zero-footprint unit has a two-year warranty. Its main drawback is that it is relatively noisy. Requires Mac Plus or later. $629. GCC Technologies, 580 Winter St., Waltham, MA 02154. (617) 890-0880. (Feb '90)



HYPERMEDIA

Ali Baa Baa and the Forty Winks ⭐⭐⭐⭐½

Ali Baa Baa and the Forty Winks is an interactive bedtime adventure in which you fly away on a magic pillow to the dark, menacing Quiltcombs to encounter dust-bunny villains. Nice illustrations. $22. Radical Sheep Productions, 62 MacDonell Ave., Toronto, Ontario M6R 2A2, Canada. (416) 531-7774. (Dec '89)



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×		×	Multiple Setup Files
×			**File Locator DA**
×	×		**Hard Disk Partitioning**
×			Automount w/Password Prompt
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MiniFinders

ArchiText ★★★★
ArchiText is a text processor with many hypertext capabilities as well as the ability to include graphics. "Nodes" of text are accessed by means of different "maps." Very powerful. Version 2.03. Requires Mac Plus or later. $395. BrainPower, 30497 Canwood St., Suite 201, Agoura Hills, CA 91301. (818) 707-1712. (Feb '89)

Authenticate and Mutate ★★★★
Authenticate and Mutate are HyperCard extensions that add valuable abilities for application programmers. Authenticate is an XFCN that lets you control the contents entered into all fields. It also lets users set the error response, which is great for database creators. Mutate, also an XFCN, formats text fields in ways that HyperCard can't begin to dream of. Authenticate, version 2.4; Mutate, version 1.0. Requires HyperCard or 4th Dimension. $125. SoftStream International, 19 White Chapel Drive, Mount Laurel, NJ 08054. (800) 262-6610. (June '90)

BMUG PD ROM ★★★★
BMUG PD ROM is a CD-ROM disc containing 300 megabytes of shareware, public-domain software, and demoware. Categories include business, education, games, fonts, Mac II-specific products, and the like. Requires Mac Plus or later. $99.95. Discovery Systems, 7001 Discovery Blvd., Dublin, OH 43017. (614) 761-4133. (July '89)

ClubMac CD-ROM ★★★½
ClubMac CD-ROM discs contain 430 to 500 megabytes of software, including DAs, sounds, editors, word-processing utilities, spreadsheet templates, and 80 megabytes of stacks. Has user rating system, classified-ad section, and electronic-bulletin-board support. Released quarterly. Fall '88 and Winter '89 reviewed. Single issue, $199; annually, $350. Quantum Access, 50 Briar Hollow W., Houston, TX 77027. (713) 622-3211. (July '89)

Course Builder ★★★★
Course Builder creates standalone educational applications. This easy-to-learn dedicated programming language uses blocks and arrows. Graphics, animation, and sound can be integrated. Version 2.0 allows mathematical calculations. Bad documentation. Version 3.21. Black-and-white, $395; color, $695. TeleRobotics International, 7325 Oak Ridge Highway, Suite 104, Knoxville, TN 37921. (615) 690-5600. (Oct '87)

Dialoger ★★★★
Dialoger is a great HyperCard utility for programmers. It uses an easy-to-master palette-based interface that lets you build complex dialog boxes. Virtually all the power of the Mac's Dialog Manager is available. It can make a huge difference in the appearance and functionality of your stacks. Version 1.02. Requires Mac Plus or later. $94.29. theResult Software, 616D Guilford College Road, Greensboro, NC 27409. (800) 365-5034 or (919) 294-5034. (Feb '90)

Educorp CD-ROM ★★
Educorp CD-ROM contains approximately 300 megabytes of shareware, public-domain software, and demoware in 23 categories such as business education, music, and fonts; has an electronic bulletin-board system. Version 4.0. Requires HyperCard 1.2. $199. Educorp, 531 Stevens Ave., Suite B, Solana Beach, CA 92075. (619) 259-0255. (July '89)

Family Matters ★★★½
Family Matters is a set of HyperCard stacks that lets you catalog family and personal information. Has areas for historical information, current possessions, and data. Decent organization. The interface is pretty bare bones, and the printing abilities are inadequate. Version 1.0. Requires Mac Plus or later and HyperCard. $49.95. Spinnaker Software Corp., One Kendall Square, Cambridge, MA 02139. (800) 826-0706. (Jan '90)

Guide ★★★★
Guide is a true hypertext tool that allows the easy creation of complex associative documents. There are no screen-size limitations. A conversion utility lets Macintosh Guide documents run under Windows Guide. The performance is excellent, with some limitations. Version 2.0. Requires Mac Plus or later. $295. OWL International, 2800 156th Ave. S.E., Bellevue, WA 98007. (206) 747-3203 (Apr '90)

HyperAnimator ★★★★
HyperAnimator lets you create talking heads for HyperCard stacks using MacinTalk or digitized sound resources. Easy to implement, especially if you know HyperCard well. Version 1.5.1. $199.95. Bright Star Technology, 1450 114th Ave. S.E., Suite 200, Bellevue, WA 98004. (206) 451-3697. (Feb '89)

HyperAtlas ★★★
HyperAtlas is a collection of U.S. and world maps that are networked to stacks containing economic, political, and population data. Version 1.0. Requires HyperCard and second disk drive or hard-disk drive. $99. MicroMaps Software, P.O. Box 757, Lambertville, NJ 08530. (609) 397-1611. (Oct '88)

HyperBASIC ★★★½
HyperBASIC is a stand-alone XCMD-compiler application. You must be able to program in BASIC to use it. Its BASIC is pretty standard and gives access to 352 Toolbox traps (not a lot). There's no debugging ability worth using, and the manual is poor. This is not a good system for HyperCard XCMD creation yet. Version 1.05. Requires Mac Plus or later; HyperCard. $99. Teknosys, 3923 Coconut Palm Drive, Suite 111, Tampa, FL 33619. (813) 620-3494. (May '90)

HyperCard ★★★★
HyperCard is a unique program for the Mac. It uses an index-card metaphor, and it contains the HyperTalk programming language. Version 1.2.5. Requires Mac Plus or later. Free with new Macs and bundled with many HyperCard stacks; otherwise, $49.95. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (Dec '87) ★'87 Eddy

HyperDA ★★★★
HyperDA lets you browse through HyperCard stacks via a DA. A true equalizer for 512K users who cannot normally access stackware. Doesn't support global variables. Version 1.2.2. Requires Mac 512K or later. $69. Symmetry, 8603 E. Royal Palm, Suite 110, Scottsdale, AZ 85258. (800) 624-2485. (May '88)

HyperHIT ★★★½
HyperHIT is a set of HyperCard XFCNs and XCMDs that lets you build database applications in HyperCard. Has many powerful functions and tools. HyperTalk experience is required, and results are as slow as HyperCard always is. Version 1.0. Requires HyperCard. $195 plus licensing fees for commercial use. SoftStream International, 19 White Chapel Drive, Mount Laurel, NJ 08054. (609) 866-1187. (Jan '90)

HyperTMON ★★★½
HyperTMON is the first true HyperTalk debugger. This XCMD is good but needs some work. Although it's a decent debugger, it has trouble stepping through some HyperTalk code and has a few command incompatibilities that should be fixed. Version 1.0. Requires Mac Plus or later and HyperCard. $99.95. ICOM Simulations, 648 S. Wheeling Rd., Wheeling, IL 60090. (708) 520-4440. (Apr '90)

HyperTutor ★★★★½
HyperTutor is a stack that teaches HyperTalk, HyperCard's programming language. Uses an interactive Test Mac on each card to write scripts. A variety of windows makes it good for both beginners and advanced programmers. Version 1.12. $49.95. Power Up Software, 2929 Campus Drive, San Mateo, CA 94403. (415) 345-9381. (Apr '88)

Macintosh Bible: STAX Edition! ★★★
Macintosh Bible: STAX Edition! is the HyperCard version of the first edition of *The Macintosh Bible*. Covers system software, applications, hardware, and consumer advice. Requires 1 megabyte, two 800K disk drives, and HyperCard; hard-disk drive recommended. $39.95. STAX! to the Mac, 8008 Shoal Creek Blvd., Austin, TX 78758. (512) 467-4550. (Mar '89)

MindLink ★★★½
MindLink is a HyperCard-based idea processor. It focuses on the first part of the brainstorming process, leading you through a structured procedure that "exercises" your mind. It asks questions that force you to focus on the problems being researched. Since HyperCard is not fast enough to keep up with your thoughts, it's frustrating. Version 1.0. Requires Mac Plus or later and HyperCard. $499. MindLink, Box 247, North Pomfret, VT 05053. (802) 457-2025. (May '90)

Nutrition 2.0 ★★★½
The Nutrition HyperCard stack is a good way to help you maintain a healthy diet. The nutritional database needs more information, but otherwise the stack is very useful. Version 2.01. Requires Mac Plus or later and HyperCard. $79. Big Byte Software, 25 Blake St., Needham, MA 02192. (617) 444-3028. (Apr '90)

Nuts & HyperBolts ★★★½
Nuts & HyperBolts is a series of large HyperCard stacks that help you improve your grammar. You can work only with the mouse; there are no keyboard shortcuts — period. Version 2.0. $189.95. Sterling Swift Software, P.O. Box 43325, Austin, TX 78745-0009. (512) 280-2431. (Aug '90)

101 Scripts and Buttons for HyperCard ★★★½
101 Scripts and Buttons for HyperCard is a collection of scripts, buttons, fields, graphics, utilities, XCMDs, XFCNs, icons, cursors, and more for creating HyperCard stacks. Version 1.1. Requires HyperCard and a hard-disk drive. $69.95. Individual Software, 125 Shoreway Road, Suite 3000, San Carlos, CA 94070. (800) 331-3313 or (415) 595-8855 (CA). (June '89)

Reports ★★★½
Reports endows HyperCard stacks with the power to sort and impart information like a database does. Customizing reports is difficult. Version 1.2.2. Requires HyperCard. $119.95. Mediagenic, 3885

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Bohannon Drive, Menlo Park, CA 94025. (415) 329-0500. (Aug '88)

Script Edit ★★★★

Script Edit lets users open multiple script windows simultaneously from different stacks. It makes stack creation easier and far more convenient than previously possible. Version 1.0. Requires Mac Plus or later. $79. Somak Software, 535 Encinitas Blvd., Suite 113, Encinitas, CA 92024. (800) 842-5020 or (619) 942-2556. (Feb '90)

scriptExpert ★★★★

scriptExpert helps you generate HyperTalk scripts by leading you through the correct use of the language. Select a common command, and dialog boxes prompt you for necessary components. Version 1.2. Requires HyperCard. $79.95. Hyperpress Publishing, P.O. Box 8243, Foster City, CA 94404. (415) 345-4620. (Oct '88)

STELLAStack ★★★★

STELLAStack lets you change the boxes and circles of a STELLA simulation into familiar images and icons with digitized sounds and animation. Contains the STELLA kernel for accessing STELLA models; lets you change models in real time. Version 2.0. Requires HyperCard 1.2.1 or later. Business, $295; education, $150. High Performance Systems, 13 Dartmouth College Highway, Lyme, NH 03768. (603) 795-4857. (July '89)

Time Table of Science and Innovation ★★★½

Time Table of Science and Innovation presents events from the history of technology on a HyperCard-based CD-ROM. Text, graphics, and sound are nicely integrated, and related events are well linked. Includes HyperCard on CD-ROM. Version 2.0. $185. Xiphias, 8758 Venice Blvd., Marina Del Rey, CA 90034. (213) 841-2790. (May '89)

VideoWorks II HyperCard Driver ★★★½

VideoWorks II HyperCard Driver lets you play movies directly from a stack. It's one way to add color animation to HyperCard. Version 1.2. Requires VideoWorks II and HyperCard; hard-disk drive recommended. $99.95. MacroMind, 410 Townsend St., Suite 408, San Francisco, CA 94107. (415) 442-0200. (Dec '88)

Wild Things ★★★★

Wild Things is a set of 40 XCMDs that teaches you about XCMDs. Comes on four disks, two of which are devoted entirely to source code. Source code is provided in Pascal (MPW, TML, and Lightspeed), C (MPW and Lightspeed), and FORTRAN (MPW) for each of the XCMDs. Requires Mac Plus or later, hard-disk drive, and System 6.0.2 or later. $150. Language Systems, 441-B Carlisle Drive, Herndon, VA 22070. (703) 478-0181. (Dec '89)

XCAL ★★★½

XCAL adds calculation and spreadsheetlike abilities to stacks. Grids restricted to the size of single cards. Extends HyperCard's math abilities significantly. Manual could be better. Requires 2 megabytes and HyperCard (included). $149.95. Trendware Corp., P.O. Box 2285, Huntington, CT 06484. (203) 926-1116. (Jan '90)

MULTIMEDIA

Business Simulator ★★★★

Business Simulator is a simulation-game training tool. You have to manage a company through several stages during 25 years and decisions become more difficult over time. Version 2.0. Requires Mac Plus or later. Can run from a hard-disk drive. $69.95. Strategic Management Group, 3624 Market St., Philadelphia, PA 19104. (215) 387-4000. (Dec '87)

ColorSpace IIi/FX ★★★★

ColorSpace IIi/FX brings live 24-bit video to the Mac. The FX board converts regular TV signals so they can be displayed on the Mac. It also offers sophisticated special effects. Includes Digitizer DA to grab frames for export. The IIi lets you mix live video with computer graphics. Requires Mac II or later. IIi, $2,299; FX, $3,499. Mass Microsystems, 550 Del Rey Ave., Sunnyvale, CA 94086. (800) 522-7979 or (408) 522-1200. (Mar '90) ★'88 Eddy

MacRecorder ★★★★½

MacRecorder is an audio digitizer for adding sounds to your Mac, animations, or HyperCard stacks. Supports an extensive array of audio-manipulation effects. HyperSound Toolkit makes adding sounds to HyperCard stacks easy. Version 2.0. Requires Mac Plus or later; HyperSound requires HyperCard version 1.2.1 or later. $249. Farallon Computing, 2000 Powell St., Suite 600, Emeryville, CA 94608. (415) 596-9100. (Jan '90)

MacroMind Director ★★★★★

MacroMind Director is the best tool for creating color and black-and-white presentations. Its object-oriented animation capabilities provide numerous editing features. Allows MIDI input. Version 1.0.1. Requires Mac Plus or later and 2 megabytes for color. $695. MacroMind, 410 Townsend St., Suite 408, San Francisco, CA 94107. (415) 442-0200. (Sept '89) ★'89 Eddy

ScreenRecorder ★★★★½

ScreenRecorder is a utility for recording your on-screen Mac activities. Ideal for presentations and training. Uses a tape-recorder model. "Tapes" can include sounds recorded with applications such as MacRecorder and can be a fixed length or loop. Recordings can be installed into HyperCard stacks for easier distribution. Version 1.0. Requires Mac Plus or later. $195. Farallon Computing, 2000 Powell St., Suite 600, Emeryville, CA 94608. (415) 596-9100. (June '89)

ShowCase F/X ★★★½

ShowCase F/X is an animated-titling package that provides several textual effects, including Aegis' own Poly fonts, to use for making title sequences. Provides a good introduction to tweening and frame-by-frame animation. Version 1.0. Requires color Mac II and 2 megabytes. $395. Aegis Development, 2210 Wilshire Blvd., Suite 277, Santa Monica, CA 90403. (800) 345-9871 or (213) 392-9972. (Dec '89)

TV Producer Pro ★★★

The TV Producer Pro is a NuBus card that overlays Mac graphics and text onto a video signal. Software is clumsy to use. Requires Mac II, Apple video card, and video source. $999. Computer Friends, Inc., 14250 N.W. Science Park Drive, Portland, OR 97229. (503) 626-2291. (May '88)

VideoWorks II Accelerator ★★★★

The VideoWorks II Accelerator compiles VideoWorks II movies to make them run more smoothly. Compensates for the QuickDraw screen display. Version 1.0. Requires Mac Plus or later and VideoWorks II; hard-disk drive recommended. $195. MacroMind, 410 Townsend St., Suite 408, San Francisco, CA 94107. (415) 442-0200. (Dec '88)

VideoWorks II Clip Animation ★★★★

VideoWorks II Clip Animation's Clip Charts, Black and White Movies, and Clip Sounds are separate aids to help you construct movies and business presentations. Requires VideoWorks II. $49.95 to $59.95. MacroMind, 410 Townsend St., Suite 408, San Francisco, CA 94107. (415) 442-0200. (Aug '88)

MUSIC

Alchemy ★★★★★

Alchemy loads and edits digitally sampled sounds from most commercial samplers. Version 2.0. Requires Mac Plus or later, MIDI or RS-422 interface, and sampler. $695. Passport Designs, Inc., 625 Miramontes, Half Moon Bay, CA 94019. (415) 726-0280. CP (Oct '88) ★'88 Eddy

Apple MIDI Interface ★★★

The Apple MIDI Interface is a simple musical-instrument digital interface with a 1-megahertz clock rate. Has only one MIDI input and one output. Works with all Macs; adapter required for 128K and 512K. $99. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (June '88)

ConcertWare+ ★★★★

ConcertWare+ is an enhanced version of ConcertWare. Has different instruments and can use any four of a set of eight at any point in a piece. Supports Adobe Sonata music font. Version 5.0. $69.95. Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. (408) 438-1990. (Dec '87) ★'85 Eddy

ConcertWare+MIDI ★★★★

ConcertWare+MIDI is a composition and transcription program that can record multiple notes from a MIDI keyboard. Easy to use if you read music. Handles eight tracks of eight voices each. Version 5.1. Requires Mac 512K or later. $189.95. Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. (408) 438-1990. (Dec '87)

Cue: The Film Music System ★★★★½

Cue: The Film Music System is a powerful and versatile assistant for scoring films. Automates spotting and logging cue points and searching for matching tempos. Also performs many minor jobs, such as generating a performing-rights cue sheet. Version 3.0. Requires Mac 512KE or later. $595. Opcode Systems, 1024 Hamilton Court, Menlo Park, CA 94025. (415) 321-8977. CP (Feb '89)

Deluxe Music Construction Set ★★★★

Deluxe Music Construction Set lets you enter up to 48 voices on eight staves and play the music through the Mac's internal speaker and/or via MIDI. Version 2.5. Requires Mac Plus or later. $129.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. (800) 245-4525 or (415) 571-7171. CP (June '88)

Encore ★★★½

Encore is quasi-rule-based music-notation program with a very nice interface. It supports multiple files and can deal with large scores. Version 1.1.6a. Requires Mac Plus or later. $595. Passport Designs, 625 Miramontes St., Half Moon Bay, CA 94019. (415) 726-0280. (May '90)

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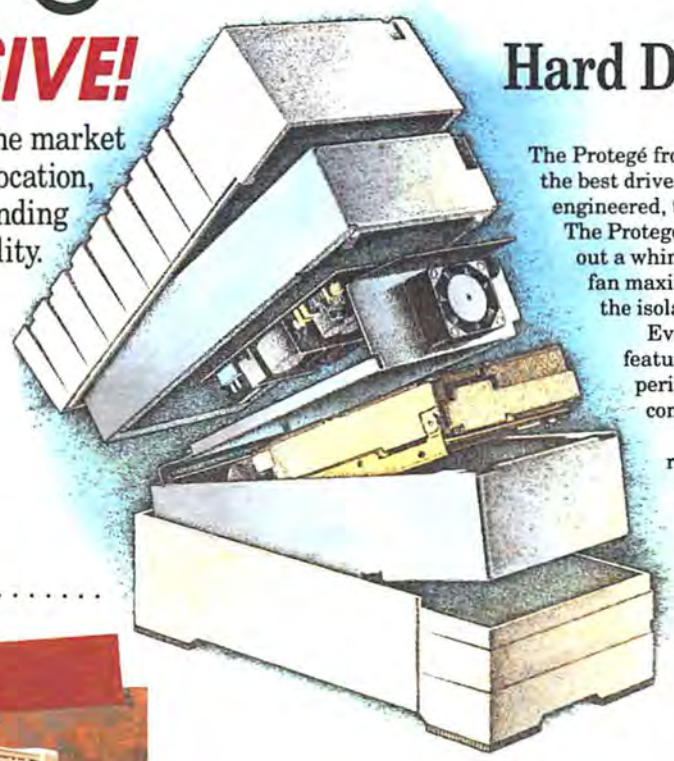
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ThunderScan Plus	*22757*	—$199
Microtek		
300Z Color Scanner	*22755*	—$2049
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Aapps DigiVideo Color	*23733*	—$399
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Et Cetera

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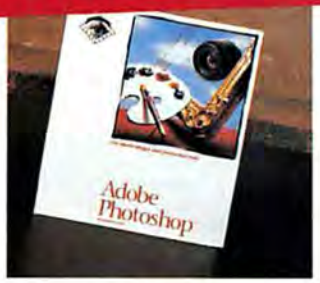
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Finale packs power and a much-improved interface and manuals. It's best suited to users needing absolute control over all the music elements in large-scale compositional and/or publishing projects. Version 2.0 Requires Mac Plus, hard-disk drive, MIDI instrument and interface, and PostScript printer. $749. Coda Music Software, 1401 E. 79th St., Minneapolis, MN 55425-1126. (800) 843-1337 or (612) 854-1288. (May '90)

Graphic Notes ♦♦♦♦

Graphic Notes is a very good page-layout program for music notation, with MIDI support. Comes with special musical-notation keypad. Version 2.0. Requires Mac Plus or later. $595. Music Software Plus, 7000 Soquel Drive, Suite 444, Aptos, CA 95003. (Apr '89)

Harmony Grid ♦♦♦♦½

Harmony Grid offers an experiential approach to harmony theory. Users are presented with a grid, so they can see scales and chords as repeating patterns. They play these tones by moving the mouse over the grid, resulting in improvisation without requiring any training or technique. The program automatically provides counterpoint as well. Supports MIDI. Version 1.05. $99. Hip Software, 117 Harvard St., Suite 3, Cambridge, MA 02139. (617) 661-2447. (Aug '90)

Jam Factory ♦♦♦

Jam Factory is a program for performing complex manipulations on MIDI data in real time. Unique, entertaining, and very powerful but requires lots of patience and practice. Version 2.0. Requires Mac 512K or later, MIDI interface, and MIDI synthesizer. $249. Intelligent Music, 116 N. Lake Ave., Albany, NY 12206. (518) 434-4110. CP (Oct '87)

Jam Session ♦♦♦♦

Jam Session is a music program for those who think MIDI refers to the length of skirts. Without any skill, you can "jam" with rock, jazz, rap, or country tunes. A sort of "Sing Along with Mitch" for the computer set. Requires Mac 512K or later. $49.95. Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101. (415) 492-3200. CP (July '88)

Listen ♦♦♦♦

Listen is an educational tool for ear training. It has a piano keyboard and a guitar fret board for users to input notes, and it offers a wide range of exercises. Version 2.1. $99. CTM Development, 1013 S. Claremont, Suite 1, San Mateo, CA 94402. (415) 573-8945. (Jan '87)

M ♦♦♦

M is a music-composition and -creation program that works with MIDI data in real time. Unique, entertaining, and powerful but requires lots of practice and patience. Version 2.0. Requires Mac 512K or later, MIDI interface, and MIDI synthesizer. $249. Intelligent Music, 116 N. Lake Ave., Albany, NY 12206. (518) 434-4110. CP (Oct '87)

Master Tracks Pro ♦♦♦♦½

Master Tracks Pro is a full-featured second-generation MIDI sequencer that adheres to the Mac interface very well. It's the first program to have graphics-controller editing. Version 4. Requires Mac 512KE or later. $495. Passport Designs, 625 Miramontes St., #103, Half Moon Bay, CA 94019. (415) 726-0280. CP (Dec '87)

MIDIBASIC ♦♦♦♦

MIDIBASIC is a simple but highly useful routine for writing MIDI software. Good stuff. Sketchy documentation. Works with both Microsoft BASIC and ZBASIC. Version 3.0. Requires Mac 512K plus BASIC. $99.95. Altech Systems, 831 Kings Highway, Suite 200, Shreveport, LA 71104. (318) 226-1702. (Aug '87)

Music Mouse ♦♦♦♦♦

Music Mouse is a music program in a genre all its own. Called an intelligent instrument, Music Mouse gives you instant musical feedback as you move the mouse and type on the keyboard, which controls tempo, vibrato, volume, and so on. Version 2.02. $79.95. Dr. T's Music Software, 220 Boyiston St., Suite 206, Chestnut Hill, MA 02167. (617) 244-6954. (May '87)

MusicProse ♦♦♦♦

MusicProse, a subset of Finale 2.0, was designed specifically for preparing lead sheets, piano-vocal parts, and small ensemble scores. It's relatively easy to learn and is a very good performer. Version 1.0. Requires Mac Plus or later. $249. Coda Music Software, 1401 E. 79th St., Minneapolis, MN 55425-1126. (800) 843-1337 or (612) 854-1288. (May '90)

Perceive ♦♦♦♦

Perceive is a multipart music-training package. Generally effective tools train the ear. Not all parts are equally good. Requires any Mac. $99. Coda Music Software, 1401 E. 79th St., Minneapolis, MN 55425. (800) 843-1337 or (612) 854-1228. (Mar '90)

Performer ♦♦♦♦

Performer is a full-featured MIDI sequencer that includes looping, SMPTE synching, 32 simultaneous Ins and Outs, unlimited overdubbing, and compatibility with Professional Composer for transcription. Version 3.4. Requires Mac 512K or later and MIDI interface. $495. Mark of the Unicorn, 222 Third St., Cambridge, MA 02142. (617) 576-2760. CP (Jan '88)

Practica Musica ♦♦♦♦♦

Practica Musica is a classic-harmony course taught as a series of 11 activities that are presented as games. Topics include simple pitch reading and writing, scales, modes, interval recognition, chord spelling, and ear training. Supports MIDI. Version 2.2. $125. Ars Nova Software, P.O. Box 637, Kirkland, WA 98083. (800) 445-4866. (Aug '90)

Professional Composer ♦♦♦½

Professional Composer produces performance-quality sheet music using Adobe's Sonata font. Scores can be created from scratch or imported from Performer (and can be exported to Performer for MIDI playback). Version 2.3. Requires Mac 512K or later. $495. Mark of the Unicorn, 222 Third St., Cambridge, MA 02142. (617) 576-2760. CP (Jan '88)

Sound Designer ♦♦♦♦

Sound Designer set the standard for editing samples on lower-cost samplers, but it still lacks real-time high-fidelity playback. Requires Mac 512K or later, sampler, and MIDI interface. Emax, E II, 2000/2002, DSS-1, S900, $495; all others, $395; Sound Designer Universal, version 1.5, $395; Sound Designer II, version 1.03, $995. Digidesign, 1360 Willow Road, Suite 101, Menlo Park, CA 94025. (415) 688-0600. CP (Oct '88)

Studio Session ♦♦♦♦½

Studio Session consists of two programs — Editor and Player — that produce music with six voices of digitized sound. Excellent program and manual make this a good buy. $89.95. Bogas Productions, 1520 Pacific Ave., San Francisco, CA 94109. (415) 673-2532. (Aug '87) ★'86 Eddy

Turbosynth ♦♦♦♦♦

Turbosynth creates sounds for a digital sampler using modular-synthesis techniques. Good harmonic spectral inverter. Lacks an easy method of multisampling. Version 2.0. Requires Mac Plus or later, sampler, and MIDI interface. $349. Digidesign, 1360 Willow Road, Suite 101, Menlo Park, CA 94025. (415) 688-0600. CP (Oct '88)

UpBeat ♦♦♦½

UpBeat turns the Mac into a front panel for a highly complex and versatile drum machine. Input patterns with mouse, MIDI keyboard, or drum machine. Version 2.0. Requires Mac 512K or later. $249. Intelligent Music, 116 N. Lake Ave., Albany, NY 12206. (518) 434-4110. CP (May '88)

Vision ♦♦♦♦½

Vision sets a new standard in Mac sequencers. Supports full SMPTE control, event-list and graphics editing; real-time and step recording; looping; tempo, meter, and dynamic changes; and standard MIDI files. MIDI Keys maps certain Mac keyboard commands to your MIDI controller. Faders window supports 32 faders offering real-time control of volume, tempo, and synthesizer-specific functions. Version 1.1. Requires Mac Plus or later, MIDI interface, and MIDI synthesizer. $495. Opcode Systems, 1024 Hamilton Court, Menlo Park, CA 94025. (415) 321-8977. CP (Dec '89)

NUMBER CRUNCHING

DATA ACQUISITION AND ANALYSIS

Analog Connection Workbench ♦♦♦♦½

Analog Connection Workbench is an icon-based application generator for general-purpose data acquisition, control, and analysis. Users create flow diagrams that make live color plots. Powerful and very easy to use. Version 3.0. Requires Mac SE or later. $995. Strawberry Tree, 160 S. Wolfe Road, Sunnyvale, CA 94086. (408) 736-8800. (July '89)

DeltaGraph ♦♦♦♦♦

DeltaGraph is the new champion charting tool. Has 22 types of 2-D and 3-D charts. Uses up to 256 colors per chart. Easy to use and can import data from most sources. Version 1.0. Requires System 6.0.2 or later. $195. DeltaPoint, 200 Heritage Harbor, Suite G, Monterey, CA 93940. (408) 648-4000. (Mar '90) ★'87 Eddy

Forecaster ♦♦♦♦½

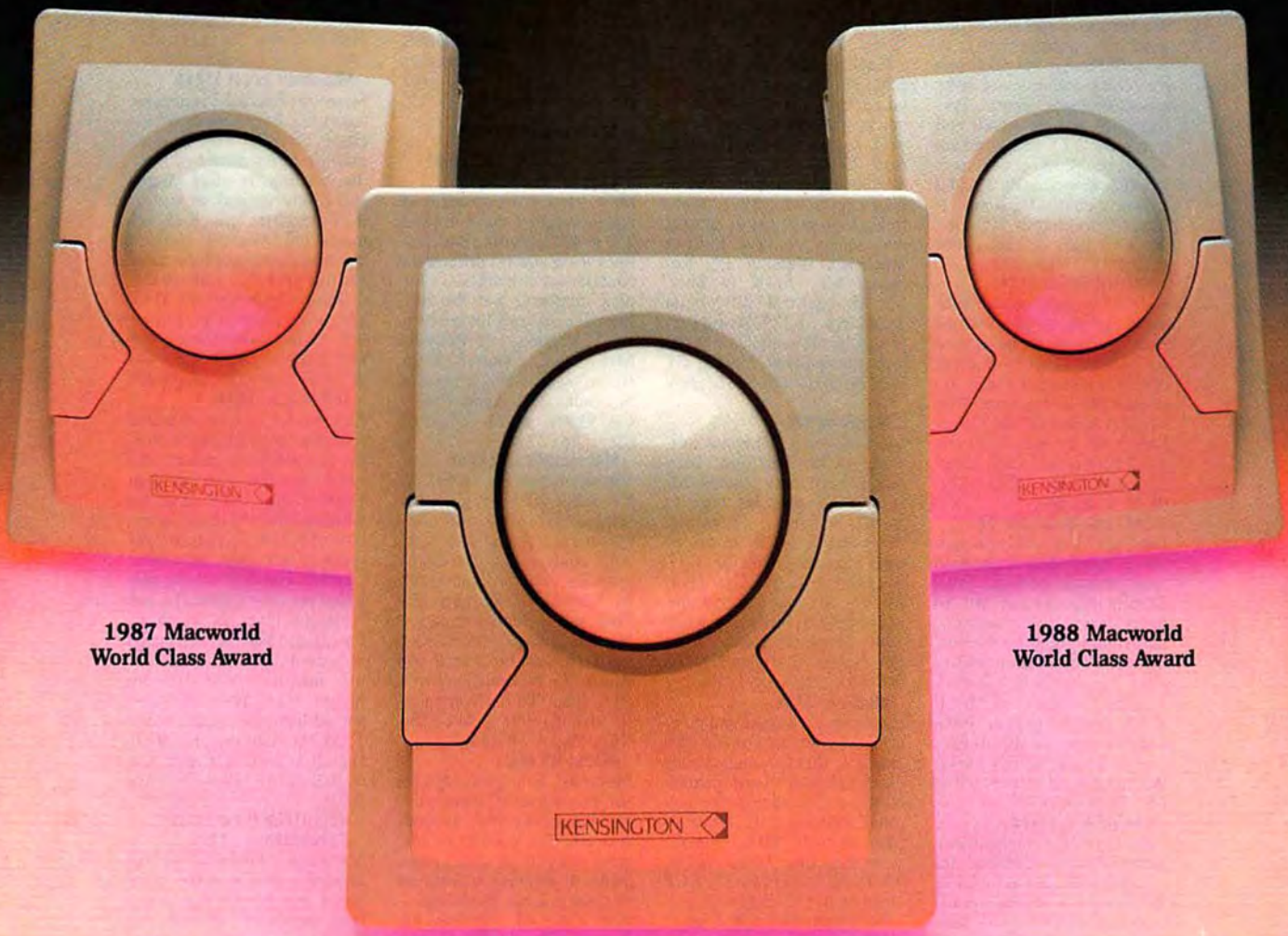
Forecaster lets you draw a curve on a chart, and it converts the curve to neatly rounded values for use in spreadsheets. The program is nearly foolproof and very useful for users preparing budgets as well as other financial projections. Version 1.0. Requires Mac Plus or later. $69.95. Palo Alto Software, 260 Sheridan Ave., #219, Palo Alto, CA 94306. (415) 325-3190. (Oct '89)

GeoQuery ♦♦♦♦

GeoQuery puts your database on the map by accessing zip-code information. Comes with maps of the U.S. Other atlases available. Version 1.0. Requires Mac Plus or later. $349. Odesta Corp., 4084 Commercial Ave., Northbrook, IL 60062. (800) 323-5423. (July '88)

Igor ♦♦♦♦

Igor is a data-visualization and -analysis program. It offers a



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reasonably complete set of options and tests. Although it doesn't have all the data-manipulation features of a statistics program, you can define anything mathematically. A powerful macro language and easy command structure make repetitive tasks simple. Performance is very good, and printing quality and speed are excellent. You can import graphics as well as data, and it supports color. Version 1.1. $295. WaveMetrics, P.O. Box 2088, Lake Oswego, OR 97035. (503) 620-3001.

KaleidaGraph ‡‡‡‡

KaleidaGraph is a superb dedicated graphing-and-analysis package. Data can be entered on a 256-column-by-32,000-row spreadsheet. Creates exceptionally nice output. Version 2.0. Requires Mac Plus or later. $249. Synergy Software, 2457 Perkiomen Ave., Reading, PA 19606. (215) 779-0522. (Feb '90)

LabTech Notebook ‡‡½

LabTech Notebook is a general-purpose data-acquisition and -analysis package. This DOS port has menus, but the interface is so poorly designed that you might as well be using a PC. This version doesn't even have a Print function. Version 1.0. Requires Mac II and System 5.0 or later. $995. Laboratory Technologies Corp., 400 Research Drive, Wilmington, MA 01887. (508) 657-5400. (July '89)

LabVIEW 2 ‡‡‡‡‡

LabVIEW 2 is a graphical programming environment for creating applications for GPIB and other data-acquisition and -control operations. Data analysis includes complex math and signal processing. Users can create on-screen control panels to emulate test instruments. The most complete such package for either PC or Mac. Requires Mac Plus or later and hard-disk drive. $1,995. National Instruments, 6504 Bridge Point Parkway, Austin, TX 78730-5039. (800) 433-4388 or (512) 794-0100. (July '89)

MacADIOS II ‡‡‡‡

MacADIOS II is a hardware and software interface for laboratory instruments. Standard configuration samples up to 142 kilohertz. Documentation is sketchy. Mac II-ready data-acquisition card, $1,490; MacAdois II software interface, $600. GW Instruments, 35 Medford St., Somerville, MA 02143. (617) 625-4096. (July '88)

MacInstruments ‡‡‡½

MacInstruments is an oscilloscope emulator with chart-recorder functions and some statistics. Records up to 833,000 samples per second and works with a wide selection of GW hardware. Version 1.05. Requires Mac with 1 megabyte. $790. GW Instruments, 35 Medford St., Somerville, MA 02143. (617) 625-4096. (July '89)

MacLab ‡‡‡‡

MacLab turns your Mac into an oscilloscope with chart-recorder functions. This hardware-software package records from 12 samples per hour to 80,000 samples per second. Nice interface and analysis features, such as slope of tangent and area under curve. Built-in amplifiers. Version 3.0. Requires Mac 512K or later. $3,535; optional differential amplifiers, $1,125. World Precision Instruments, 375 Quinnipiac Ave., New Haven, CT 06513. (203) 469-8281. (July '89)

MacPacq ‡‡‡

MacPacq is a hardware/software oscilloscope and chart-recorder emulator that records from 2 samples per hour to 10,000 samples per second. The portable hardware can be used remotely. Version 1.05. Requires Mac 512K or later. $1,195; optional external amplifiers, $295. BioPac Systems, 5960 Mandarin Drive, Suite D5, Goleta, CA 93117. (805) 967-6615. (July '89)

MacSpin ‡‡‡‡

MacSpin is a unique and powerful program for graphic-data analysis. Handles multivariate data in a highly visual manner. Nothing else like it for any micro. Version 3.0. Requires Mac SE or II. $300. D^2 Software, P.O. Box 50052, Austin, TX 78763. (512) 478-2393. CP (June '86) ★'87 Eddy

Parameter Manager Plus ‡‡‡‡

Parameter Manager Plus analyzes data, using a spreadsheetlike interface, in real time. It can handle both hand-entered and imported data. It includes statistical quality control, equation fitting, predictive maintenance, histograms, drawing, and presentation. Version 3.0. Requires Macintosh Plus or later. $595; communications module, $795. GenRad, 510 Cottonwood, Milpitas, CA 95035. (408) 432-1000. (July '89)

STELLA Software for Business ‡‡‡‡½

STELLA Software for Business is a simulation tool for modeling complex business systems. Requires that you master a discipline called system dynamics. Version 2.10. Requires Mac 512K or later. $450; academic discount, $200. High Performance Systems, 13 Dartmouth College Highway, Lyme, NH 03768. (603) 795-4857. (June '88)

SuperANOVA ‡‡‡‡½

SuperANOVA is a slick linear-modeling program with a great interface. This is not a general statistics program but a more specialized tool. Feature-laden and very powerful. Version 1.02. Requires Mac Plus or later. $495. Abacus Concepts, 1984 Bonita Ave., Berkeley, CA 94704. (415) 540-1949. (Mar '90) ★'89 Eddy

• MATHEMATICS

Math View Professional ‡‡‡½

Math View Professional is an equation solver that combines 2-D and 3-D plotting with routines for matrices, differential equations and integrals, complex numbers, and the like. Interface leaves a lot to be desired. Version 1.1. Requires Mac 512KE or later. $249.95. BrainPower, 30497 Canwood St., Suite 201, Agoura Hills, CA 91301. (818) 707-1712. (Sept '88)

Mathematica ‡‡‡‡½

Mathematica is a powerful tool for doing all kinds of math. Offers arbitrary-precision numerical calculations, symbolic computation, PostScript graphics, and programmability. Version 1.2. Requires Mac Plus and a hard-disk drive; requires 2 megabytes RAM to run kernel. $495; Mac II version, $795. Wolfram Research, P.O. Box 6059, Champaign, IL 61826. (800) 441-6284. (Nov '88) ★'88 Eddy

Model-It! ‡‡‡½

Model-It! is a good tool for simple mathematical modeling and simulating small dynamic systems. The manual is very good and performance is adequate. It requires knowledge of what you are modeling — there's no AI. Version 1.0. Requires Mac 512KE or later. $295. Norris Software Systems, 5201 Western Ave., Suite 432, Knoxville, TN 37921. (615) 588-5774. (June '90)

Theorist ‡‡‡‡‡

Theorist is an elegant equation solver that surpasses Mathematica in ease of use and practical functionality. The equation-derivation process doesn't require any programming, just click-and-drag techniques on standard symbolic algebra. Dozens of math functions and transformations automatically activated by a few menu commands. Can also visualize your equations and theories through graphs and animation, including 3-D and color. $379.95. Prescience, 814 Castro St., San Francisco, CA 94114. (415) 282-5864. (Jun '90) ★'89 Eddy

• SPREADSHEETS

DataMerge ‡‡‡‡

DataMerge simplifies manipulating tabular data. It works with all major spreadsheet programs and can merge up to nine files. The files can be larger than existing RAM. Excellent performance. Version 2.0. Requires Mac 512K or later. $99. Seawell Microsystems, P.O. Box 22030, Seattle, WA 98122. (800) 347-7008 or (206) 322-3123. (May '90)

Microsoft Excel ‡‡‡‡‡

Microsoft Excel 2.2 is a major upgrade. Improvements include variable row heights, multiple fonts, improved macros, hot links to other Microsoft products, and an end to the 1-megabyte limit. Excel remains the standard. Version 2.2. Requires Mac Plus or later and System 6.0.2 or later; hard-disk drive recommended. $395. Microsoft Corp., One Microsoft Way, Redmond, WA 98052-6399. (800) 426-9400 or (206) 454-2030. (Sept '89)

Full Impact ‡‡‡‡

Full Impact is a full-featured spreadsheet program that produces good presentations and has a smoother interface than Excel. Uses virtual memory, which needs more than 1 megabyte of RAM, to create bigger spreadsheets than any other product. FullTalk macro language is easy and graceful, and XMacros give access to C, Pascal, and Mac ToolBox calls to customize menus and create new functions. File sizes are bigger than those of other spreadsheet programs. Version 1.1. $395. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502. (213) 329-8000. (Apr '89)

MICROTEMP Financial Calculators ‡‡‡½

Microtemp Financial Calculators is a set of worksheets for Excel and Works that calculates common personal and small-business financial problems. Includes cash flow, real estate, and rate-of-return calculators. Version 1.0. $79.95. Microtemp, 318 Mendocino Ave., Suite 22, Santa Rosa, CA 95404. (707) 575-1459. (Aug '88)

101 Macros for Excel ‡‡‡‡

101 Macros for Excel offers all the power of macros without your having to learn how to write them. Some gems include a search-and-replace macro and a macro to transpose rows and columns. Requires Excel. $69.95. Individual Software, Inc., 125 Shoreway Road, Suite 3000, San Carlos, CA 94070. (800) 331-3313 or (415) 595-8855 (CA). (July '88)

Trapeze ‡‡‡½

Trapeze is a powerful presentation worksheet that combines mathematical functions and graphic representation. The interface, which is based on a special custom icon bar, can be awkward. Version 2.1. $295. DeltaPoint, Inc., 200 Heritage Harbor, Suite G, Monterey, CA 93940. (408) 375-4700. (Dec '87)



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Wingz ★★★★★

Wingz combines a powerful and roomy spreadsheet program with an easy-to-use scripting language for developing customized applications. Lacks a few standard spreadsheet niceties but makes up for it with glitzy graphics, including color and 3-D. Version 1.1. Requires 1 megabyte. $399; University edition, $89. Informix Software, 16011 College Blvd., Lenexa, KS 66219. (913) 599-7100. (June '89)

Microsoft Works ★★★★½

Microsoft Works has been the integrated program of choice for years, and this version shouldn't change that. Package includes word-processing, spreadsheet, database, telecommunications, and object-oriented-graphic abilities. Supports color. Excellent value. May be all the software you'll ever need. Version 2.0a. Requires Mac Plus or later and two 800K drives. $295. Microsoft Corp., One Microsoft Way, Redmond, WA 98052-6399. (800) 426-9400 or (206) 454-2030. (May '89)

• STATISTICS

Data Desk ★★★★

Data Desk is excellent for sophisticated analyses. It features great exploratory interactive graphics and has solid data handling. The new Layout window is very nice. It lacks econometric procedures and presentation-enhancement features. There are also importing restrictions that may cause problems. Version 3.0. Requires Mac 512KE or later. $595. Odesta, 4084 Commercial Ave., Northbrook, IL 60062. (800) 323-5423. (Apr '90)

Exstatix ★★★

Exstatix is a powerful, full-featured statistics program. Accepts user-written plug-in modules. Very good graphing ability and excellent manual. Version 1.2.2. Requires Mac Plus or later. $349. Strategic Mapping, 4030 Moorpark Ave., Suite 250, San Jose, CA 95117. (408) 985-7400. (Apr '90)

Fastat ★★★½

Fastat is a subset of Systat. It also features a Mac interface and, as a result, is somewhat slow. Its features should be enough for all but the most demanding users. Version 1.0. Requires Mac Plus or later. $195. Systat, 1800 Sherman Ave., Evanston, IL 60201. (708) 864-5670. (Nov '89)

JMP ★★★½

JMP provides good data-management and exploratory interactive-graphics tools. The performance is slow. JMP is very different from similar packages — some users will find it confusing. The range of nonparametric and multivariate procedures is too limited. Version 1.0. Requires Mac Plus or later. $695. SAS Institute, SAS Circle, Box 8000, Cary, NC 27512-8000. (919) 677-8000. (Apr '90)

StatView 512+ ★★★★★

StatView 512+ is an intuitive statistical-analysis program with tools to help you understand any set of data. Holds data in a spreadsheetlike form. Full-featured, fast, and accurate. Extremely wide range of analyses possible. Version 1.2. Requires Mac 512K or later. $300. Abacus Concepts, 1984 Bonita Ave., Berkeley, CA 94704. (800) 666-7828 or (415) 540-1949. (Dec '86)

StatView SE + Graphics ★★★★

StatView SE + Graphics is the SE version of StatView II. It features an easy-to-use interface and excellent presentation graphics. There's a full range of procedures available, but the data-transformation functions are limited. Its interactive exploratory graphics are weak, but performance is adequate. Requires Mac SE. $350; with SuperANOVA, $575. Abacus Concepts, 1984 Bonita Ave., Berkeley, CA 94704. (800) 666-7828 or (415) 540-1949. (Apr '90)

StatView II ★★★★

The StatView II statistics package features an easy-to-use interface and excellent presentation graphics. There's a full range of procedures available, but the data-transformation functions are limited. Its interactive exploratory graphics are weak, but performance is excellent. Requires SE/30 or Mac II or later. $495; with SuperANOVA, $650. Abacus Concepts, 1984 Bonita Ave., Berkeley, CA 94704. (800) 666-7828 or (415) 540-1949. (Apr '90)



ORGANIZATIONAL TOOLS

The Microsoft Office ★★★★½

The Microsoft Office is Word, Excel, Mail, and PowerPoint on a CD-ROM (a disk version is also available). A full set of Adobe screen fonts, a copy of DocuComp, Excel templates, lots of clip-art samples, and other Microsoft applications are included. A HyperCard stack controls everything and there's comprehensive on-line HyperCard documentation. Businesses just getting started will find this package a bargain. Requires Mac Plus or later; CD-ROM drive. $949. Microsoft Corp., One Microsoft Way, Redmond, WA 98052-6399. (206) 882-8080. (Apr '90)

Writer's Dreamtools ★★★★½

Writer's Dreamtools is a set of three HyperCard stacks that can be extremely useful. It comes in G- and X-rated versions. The clichés and catchphrases stacks are fascinating. There's also a comprehensive Slang stack. Requires HyperCard and a hard-disk drive to print. Complete set, $79; $35 each. Slippery Disks, P.O. Box 1126, Los Angeles, CA 90069. (800) 522-7234 or (213) 274-3600. (May '90)

• OUTLINERS

Acta Advantage ★★★★½

Acta Advantage is an outliner application. Also comes with the Acta DA. Smart Paste lets you paste material from other applications into Acta outline format. Includes drivers for translating Acta outlines into MORE and ThinkTank (both ways) and into MacWrite, WriteNow, Works, and RTF files. DA, version 3.01; application, version 1.03. Requires Mac 512KE or later. $129. Symmetry, 8603 E. Royal Palm, Suite 110, Scottsdale, AZ 85258. (800) 624-2485. (Aug '89) ★'89 Eddy

IdeaFisher ★★★★

IdeaFisher is a thought processor that's based on an eight-disk, more than 7-megabyte database of words, phrases, clichés, and titles. The database is cross-referenced and indexed in several ways. Useful search techniques are provided and your "conclusions" are held in a separate file. It's text-based, so it's fairly quick, but it's not attractive. The filters are unsophisticated, giving equal weight to everything. Requires Mac Plus or later. $495. Fisher Idea Systems, 18881 Von Karman Ave., Irvine, CA 92715. (714) 474-8111. (May '90)

MORE II ★★★★★

MORE II is an outlining and organizational tool that is an improvement over its predecessors, MORE and ThinkTank. It has on-screen capabilities well beyond its competitors', especially in a multimonitor setup. Version 2.01. Requires Mac Plus or later, System 4.1 or later, and a hard-disk drive. $395. Symantec, Living Videotext Division, 10201 Torre Ave., Cupertino, CA 95014. (408) 253-9600. (May '89)

• PERSONAL-INFORMATION MANAGERS

Address Book Plus ★★★★½

Address Book Plus is a very nice name-and-address manager. It prints only on one side of a page, but it has all the other features you might need. Its sorting and import/export abilities are good. A limited DA allows file access from other applications. Version 1.0. Requires System 6.0.2 or later. $89.95; with leather binder, $129.95. Power Up Software, 2929 Campus Drive, San Mateo, CA 94403. (415) 345-5900. (Apr '90)

Business Class ★★★½

Business Class is a HyperCard stack that contains world-travel information and itinerary planning. Uses maps to locate countries of interest, but it lacks United States domestic-travel information. Requires HyperCard. $49.95. Mediagenic, 3885 Bohannon Drive, Menlo Park, CA 94025. (415) 329-0500. (Mar '88)

City to City ★★★★

City to City imparts travel information on 31 U.S. cities, including details about hotels, restaurants, and nightlife. Helps plan an itinerary. Requires HyperCard and a printer. $49.95. Mediagenic, 3885 Bohannon Drive, Menlo Park, CA 94025. (415) 329-0500. (Sept '88)

DynoDex ★★★★

DynoDex is an address-book program. Comes with a nice binder to hold your printouts. Prints on both sides of the paper. Special paper to fit Filofax binders is included. Nice work, but needs a DA to access data while you're in other applications. Version 1.01. Requires Mac Plus or later. $149.95. Portfolio Systems, 158 Flushing Ave., Brooklyn, NY 11205. (800) 729-3966. (Feb '90)

FamilyCare ★★★

FamilyCare is a handbook of childhood diseases. The rule-based expert system gives advice based on symptoms. Ailments and diseases run the gamut from acne and appendicitis to wheezing and yeast infections. Lacks graphics. Version 1.05. Requires Mac 512K or later. $59.95. Lundin Laboratories, Inc., 29451 Greenfield Road, Suite 216, Southfield, MI 48076. (313) 559-4561. (Sept '88)

Focal Point II ★★★★½

Focal Point II is a major upgrade to Focal Point. Offers an electronic-mail system and the Task Manager module in addition to more print options. Contains the 16 original modules, including calendar, telephone log, and client accounts. Version 1.0.1. Requires HyperCard 1.2.2 or later and a hard-disk drive. $199.95. TenPointO, 3885 Bohannon Drive, Menlo Park, CA 94025. (415) 329-7616. (Apr '89)

For the Record ★★★★

For the Record is a database designed for legal, financial, and personal records. Allows password locking of screens containing sensitive personal data. Version 1.0. Requires Mac 512KE. $49.95. Nolo Press,

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950 Parker St., Berkeley, CA 94710. (415) 549-1976. (Feb '89)

Front Desk MultiUser ★★★½
Front Desk MultiUser is a schedule and resource manager best suited for small professional offices. Can be used in a networked multiuser environment. Basic functionality but simple and capable. Version 6.10. Requires Mac 512KE and System 5.0 or later (single user); Mac Plus and System 5.0 or later (multiuser). Single user, $99; 2 to 5 users, $75 each; 6 to 10 users, $60 each; 11 or more users, $40 each. Layered, The Schrafft Center, 529 Main St., Boston, MA 02129. (617) 242-7700. (Jan '90)

MacPhonebook ★★★½
MacPhonebook handles name-and-address lists with up to 1,600 entries. Its forte is printing lists in large, medium, and small (Little Black Book) formats. Version 1.0. Requires Mac 512K or later. $79.95. Synex, 692 Tenth St., Brooklyn, NY 11215. (718) 499-6293. (Oct '89)

My Time Manager ★★★½
My Time Manager is a complete HyperCard-based organizer with a full range of nicely implemented tools including an appointment book, an address and phone book, a notes and contacts area, and a dialer. Only daily and monthly reports are available for printing. Its performance is good. and the publisher support is excellent. Version 2.0. Requires Mac Plus or later and HyperCard. $79.95. MacShack Enterprises, 19 Harrington Road, Cambridge, MA 02140. (617) 876-6343. (Apr '90)

QuickDEX ★★★★½
QuickDEX keeps your telephone numbers in an electronic Rolodex DA. Can dial phones easily. Version 1.4a. Requires Mac 512KE or later; hard-disk drive recommended. $60. Casady & Greene, P.O. Box 223779, Carmel, CA 93922. (408) 624-8716. (Jan '89)

Remember? ★★★★
Remember? is a nice shareware INIT that lets your Mac remind you of important items. Every time you start up, if you've entered a note for the day via Remember?'s DA, it presents a window with the details. Its free-form occasion list is easy to maintain. The DA also lets you check your calendar in advance. Implementation is clean. Version 1.3. Shareware: $10. David Warker, 1330 W. North St., Egg Harbor, NJ 08215-1763. (July '90)

Take Control of Cholesterol ★★★½
Take Control of Cholesterol is one of a series of health- and food-related programs. It's clearly a port from a simpler interface, but in spite of that, it's a good tool. It's designed to be used with *Eater's Choice*, a book that tells you how to reduce cholesterol by lowering your saturated-fat intake. The program sets up worksheets and lets you fill out meal plans. Version 2.0. $39.95. Lifestyle Software Group, 63 Orange St., St. Augustine, FL 32084. (800) 289-1157 or (904) 825-0220. (Aug '90)

WillMaker ★★★½
WillMaker is a simple yet valuable run-time BASIC program for creating wills. Not elegant, but it does the job well. Version 3.0. $59.95. Nolo Press, 950 Parker St., Berkeley, CA 94710. (415) 549-1976. (Mar '89)

• ORGANIZERS

DiagramMaker ★★★★
DiagramMaker is a jack-of-all-trades object-linking program. Can form a network of custom-designed objects with connecting points at the centers, corners, or centers of sides. Can make custom organization charts from text outlines. Lines join on contact and can be pulled into arcs. Objects can be linked to objects in other documents. No automatic right-angle line maintenance. Text-find feature is useful and unique. Version 1.1. Requires Mac 512K or later. $145. Action Software, 1507 E. Franklin St., Suite 122, Chapel Hill, NC 27514. (919) 942-1111. (Jan '90)

FastTrack Schedule ★★★★½
FastTrack Schedule is a flexible Gantt-based project scheduler that uses a hierarchical outline format. Provides the highest degree of functionality and the best on-screen and printed-graphics abilities in its class. A perfectly suited project-management system for the Mac. Version 1.03. Requires Mac Plus or later. $195. AEC Management Systems, 22611 Markey Court, Building 113, Sterling, VA 22170. (703) 450-1980. (Oct '89)

FlowMaster ★★★★½
FlowMaster charts your ad dollars in print, TV, billboard, and other media. Analyzes costs/benefits of a campaign in terms that even the most jaded Madison Ave. execs will find innovative. Includes bar-chart and tabular output as well as a color-drawing environment for touching up charts. Version 2.01. $795. Telmar Information Services, 902 Broadway, New York, NY 10010. (212) 460-9000. (June '90)

Information Manager ★★★★
Information Manager is a dedicated database program for managing project information. Designed to be used in conjunction with MacProject II or Micro Planner. Helps to track data needed to make decisions and monitor status. A useful alarm feature keeps track of critical dates. Version 1.22. Requires Mac Plus or later. $195. AEC Management Systems, 20524 Amethyst Lane, Germantown, MD 20874. (301) 428-3694. (Oct '89)

KeyPlan ★★★★
KeyPlan is a hybrid outliner/project planner. It lacks some of the powerful tools of MacProject II and Micro Planner but is easier to use. It's flexible, fast, and suited for managers who need some quick project-planning help. Version 1.0. Requires Mac Plus or later; System 6.0.2 or later. $395. Symmetry Software, 225 E. First St., Mesa, AZ 85203. (602) 844-2199. (Apr '90) ★'89 Eddy

MacFlow ★★★★
MacFlow is a capable process-flow diagrammer with hierarchical nesting capabilities. Good control over intersection of lines and symbols. Imports art for conversion to custom symbols. Good user control over symbol connection points. Reconnection mechanism is good but can go partly awry with major object shifts. Excellent line-segment editing. Version 3.12. Requires Mac Plus or later and System 6.02 or later. $245. Mainstay, 5311B Derry Ave., Agoura Hills, CA 91301. (818) 991-6540. (Feb '90)

MacProject II ★★★★
MacProject II is a well-executed PERT and CPM project-management system with time and expense reporting. Can manage projects and produce management reporting. Crisp documentation with an easy-to-follow design makes this package a true value. Version 2.1v2. Requires Mac Plus or later. $499. Claris Corp., 5201 Patrick Henry Drive, Santa Clara, CA 95052. (408) 987-7000. (Oct '89)

MacSchedule ★★★½
MacSchedule is a simple Gantt-based project-management and outliner system. Offers advanced project-time scaling but isn't for advanced Gantt users. Limited color, graphics, and printing capability. Version 2.0. Requires Mac Plus or later. $195. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. (818) 991-6540. (Feb '90)

MetaDesign ★★★★½
MetaDesign is a powerful organizational tool that goes beyond mere flowcharting. Graphically depicts relationships among systems. Complex, detailed program aimed at software pros. Version 2.3. Requires Mac Plus or later. $250. Meta Software Corp., 150 Cambridge Park Drive, Cambridge, MA 02140. (800) 227-4106. (Apr '88)

Micro Planner Plus and Project Exchange ★★★★½
Micro Planner Plus and Project Exchange provide full PERT and CPM implementations with advanced resource leveling and management reporting. Output can be used easily for management presentations. Micro Planner Plus, version 6.1F; Project Exchange, version 1.08. Requires Mac Plus or later. Micro Planner Plus, $595; Project Exchange, $100. Micro Planning International, 655 Redwood Highway, Suite 311, Mill Valley, CA 94941. (415) 389-1420. (Oct '89)

PERT & Critical Path Techniques ★★★½
PERT & Critical Path Techniques is technically the most sophisticated project-management system of all. Has a full Gantt and CPM implementation, including all second-order slack and timing calculations, but does not make good use of the Mac interface. Project-manager aficionados might want to consider this one. Version 6.0. Requires any Mac. $152. Lionheart Press, P.O. Box 379, Alburg, VT 05440. (514) 933-4918. (Oct '89)

Rendezvous ★★★★
Rendezvous is a classy personal organizer with excellent printing abilities. Lacks a name-and-address section and needs automatic transfer of data between sections. Still, it's nice and quite useful. Version 2.5. Requires Mac 512KE or later and System 6.0 or later. $200. PMC Telesystems, P.O. Box 5127, Vancouver, British Columbia V6B 4A9, Canada. (604) 255-9949. (Feb '90)

Schedule Maker ★★★★
Schedule Maker is a dedicated employee- or equipment-scheduling system that uses a simple Gantt-type chart format but is not a project-management tool. Automates the process of figuring out who should work when and how much it will cost. Version 2.0. Requires any Mac. $295. Craig Management, 16717 Monitor Ave., Baton Rouge, LA 70817. (504) 291-6348. (Oct '89)

Tim Berry's Business Plan Toolkit ★★★★½
Tim Berry's Business Plan Toolkit is an integrated set of Excel macros and templates with HyperCard-based text that makes creating business plans and forecasts relatively easy. Excellent manual. Version 3.01. Requires Mac 512K or later and System 4.2 or later. $99.95. Palo Alto Software, 260 Sheridan Ave., #219, Palo Alto, CA 94306. (415) 325-3198. (Sept '89)

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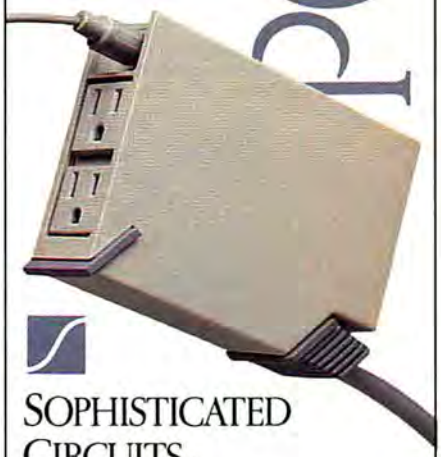
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and organization-chart tool with a choice of connection modes for each individual line. Can generate text-based reports. Has excellent right-angle-reconnection talents, even with major object shifts. Limited user control of where lines connect to symbols. No line nodes for other lines to attach. Excellent navigation throughout hierarchy, view to view, and page to page. Version 1.1a. Requires Mac Plus or later and System 6.02 or later. $345. Kaetron Software, 112777 Jones Road, Suite 445, Houston, TX 77070. (713) 890-3434. (Jan '90)

0110 PROGRAMMING

• LANGUAGES

AAIS Prolog ⚡⚡⚡⚡

AAIS Prolog is a fast standard Prolog with excellent debugging and error handling. Good for serious program development. Documentation is not as good as the program. Version M-2.0. $298. Advanced AI Systems, P.O. Box 39-0360, Mountain View, CA 94039-0360. (415) 948-8658. (Mar '87)

Acknowledge ⚡⚡⚡⚡½

Acknowledge lets advanced programmers create customized applications that can accomplish many telecommunications tasks — from automatically picking up E-mail to communicating with VAXes. Version 1.0. Requires Mac 512KE. $499. Prometheus Products, 7225 S.W. Bonita Road, Tigard, OR 97223. (503) 624-0571. (Jan '89) ★'88 Eddy

ANATOOL ⚡⚡⚡⚡

ANATOOL is a CASE package for software engineers needing a data-flow-diagramming tool. Uses a simple palette and drag interface for building DFDs. Integration of components is excellent. Good documentation and consistency checking. Version 3.1. Requires Mac 512KE or later; hard-disk drive recommended. $925. Advanced Logical Software, Inc., 9903 Santa Monica Blvd., Suite 108, Beverly Hills, CA 90212. (213) 653-5786. (Jan '90)

Cause ⚡⚡⚡

Cause is a database-programming environment for nonprogrammers. Fulfills its claims but is flawed by nonstandard formats and its inability to create a true Mac interface. Has a matching DOS version, and your projects are portable. Version 1.04. Requires Mac 512KE or later. PC and Mac versions, $295 each; combined, $495. Maxem, 7855 S. River Parkway, Tempe, AZ 85284. (800) 336-6296. (Feb '90)

ExperCommon LISP ⚡⚡⚡

ExperCommon LISP is a LISP development system. Not fully Common LISP-compatible but creates good compiled code and stand-alone applications. Version 2.2. Requires Mac Plus or later. $995. ExperTelligence, 5638 Hollister Ave., Suite 302, Goleta, CA 93117. (805) 967-1797. (Aug '87)

ExperProlog II ⚡⚡⚡

ExperProlog II is a Prolog based on the new Prolog II standard. Can handle infinite trees and allows user-defined functions that operate conditionally. Has nonstandard Mac interface, and documentation is not the best. Version 2.4. $495. ExperTelligence, 5638 Hollister Ave., Suite 302, Goleta, CA 93117. (805) 967-1797. (Mar '87)

Macintosh Allegro Common LISP ⚡⚡⚡⚡⚡

Macintosh Allegro Common LISP is a development environment with an EMACS-style editor that implements most Common LISP editing and debugging functions. Version 1.2.2. Requires Mac Plus or later and a hard-disk drive. $495. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (408) 996-1010. (Nov '88) ★'88 Eddy

Quintus MacProlog ⚡⚡⚡⚡

Quintus MacProlog is a much improved program that includes incremental and optimizing compilers, a graphics-environment package, as well as C and Pascal submodules. Supports color. Version 3.0. Requires Mac Plus or later. $595. Quintus Computer Systems, 1310 Villa St., Mountain View, CA 94041. (415) 965-7700. (Feb '88)

Prolog/m ⚡⚡⚡⚡

Prolog/m is a solid Prolog application that follows the Edinburgh standard. Has extensive debugging facilities, but you'll need a separate Toolbox disk with 58 additional predicates. Lacks true editing or printing facilities. $99.95. Chalcedony Software, 5580 La Jolla Blvd., La Jolla, CA 92037. (Mar '87)

THINK C ⚡⚡⚡⚡½

THINK C features rapid turnaround time for development and testing of programs through use of an integrated compiler, linker, and editor. Source-level debugger steps through your code line by line to examine the values of variables. Version 4. Requires 2 megabytes. $249. Symantec, 10201 Torre Ave., Cupertino, CA 95014. (408) 253-9600. (Mar '90) ★'88 Eddy

THINK Pascal ⚡⚡⚡⚡⚡

THINK Pascal is a fast, powerful development system for Pascal programming. Fully integrated Mac-like environment. Blazing speed. Compiles MacApp code. Version 3.0. Requires Mac Plus or later. $249. Symantec, 10201 Torre Ave., Cupertino, CA 95014. (408) 253-9600. (Feb '87)

TML (MacLanguage Series) Pascal II ⚡⚡⚡⚡⚡

TML (MacLanguage Series) Pascal II is a good Pascal compiler, capable of producing stand-alone programs. Can use most existing Lisa Pascal programs with only slight modification. Version 3.0. Requires Mac Plus or later. $195. TML Systems, 8837-B Goodbys Executive Drive, Jacksonville, FL 32217. (904) 636-8592. (June '86) ★'86 Eddy

• TOOLS

FEdit Plus ⚡⚡⚡

FEdit Plus is the file and disk editor for everyone, from newest Mac owner to oldest. Can recover deleted MFS files. Not fully HFS-compatible. Version 1.1. Requires Mac 512KE or later. $49.95. MacMaster Systems, 108 E. Fremont Ave., #37, Sunnyvale, CA 94087. (408) 773-9834. (Sept '86) ★'86 Eddy

INIThound ⚡⚡⚡⚡⚡

INIThound is a developer's tool that carefully monitors the startup process and reports, in excruciating detail if desired, exactly what transpires. A very handy problem-locating tool. Strictly speaking, it's not a debugger. Version 1.0. Requires Mac Plus or later. $129. Cambridge Information Ware, P.O. Box 1296, Cambridge, MA 02238-1296. (617) 484-8364. (Mar '90)

Instant-Expert ⚡⚡⚡½

Instant-Expert is an excellent way to learn the mechanics of creating an expert system. The inference engine (which ultimately finds the answer) is visible. Interface is weak. Version 2.0. $69.95. Human Intellect Systems, 1670 S. Amphlett Blvd., Suite 326, San Mateo, CA 94402. (415) 571-5939. (Jan '88)

Just Enough Pascal ⚡⚡⚡⚡

Just Enough Pascal is a Pascal tutorial. It has an excellent manual and 20 well-planned lessons. Good for users wanting to learn how to program Macs. Also a good introduction to Pascal. Version 1.0. Requires Mac Plus or later, System 5.0 (System 6.0 for Mac IIs), and THINK Pascal 2.0 or 3.0. $75. Symantec, 10201 Torre Ave., Cupertino, CA 95014. (408) 253-9600. (Sept '89)

Lasertalk ⚡⚡⚡⚡⚡

Lasertalk is a PostScript programming tool that establishes interactive contact with laser printers. Its Preview window and on-line help make it a powerful aid. Requires Mac Plus or later and a PostScript printer. $249.95. Emerald City Software, 1890 Shoreline Blvd., Mountain View, CA 94043. (800) 447-3577 or (415) 324-8080. CP until registered (May '88)

MacSMARTS ⚡⚡⚡

MacSMARTS can create small stand-alone expert systems. Features hypertext connections to MacPaint, PICT, SYLK, and text files. Still a little buggy. Version 3.3. Requires Mac 512K or later. $195. Cognition Technology, 55 Wheeler St., Cambridge, MA 02138. (800) 622-2829. (Jan '88)

Nexpert OBJECT ⚡⚡⚡⚡½

Nexpert OBJECT is a powerful expert-system shell for the Mac. The system is rule- and object-based, with an excellent editing interface. The inference engine chains backward and forward, and inheritance is bidirectional between classes and objects. Knowledge bases can be ported to other platforms without rewriting. Not copy protected, but installation is limited to one per package. Version 1.1. Requires a Mac Plus or later; hard-disk drive and color monitor recommended. $5,000. Neuron Data, 444 High St., Palo Alto, CA 94301. (415) 321-4488. (Sept '89)

PostShow ⚡⚡⚡½

PostShow is an interactive set of modules that lets programmers see the effects of code. It is straightforward to use — not too fast, but adequate. Supports the most common PostScript commands. Version 1.0. Requires Mac Plus or later. $224.95; LWM 22 (22 additional fonts), $89.95; PostShow Professional (includes all fonts), $294.95. Lincoln & Company, 45 Winthrop St., Concord, MA 01742. (800) 223-7469 or (508) 369-1441. (Apr '90)

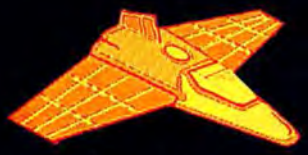
Preditor ⚡⚡⚡

Preditor is a programming editor that can do true rectangular editing (manipulate blocks of text that are not at full page width). Marred by indifferent performance, an odd interface, and a weak manual. Version 1.0.1. Requires Mac Plus or later. $90. Evatec, P.O. Box 219093, Portland, OR 97225. (503) 297-6175. (Mar '90)

Prototyper ⚡⚡⚡⚡

Prototyper is an application-specification program. Lets you create a program interface and simulate how an application would work. Comes with source-code generators for THINK C 3.0, MPW C 2.0 and 3.0, Turbo Pascal, THINK Pascal, MPW Pascal, and TML Pascal II. A useful tool for quick and easy application mock-ups. Version 2.1. Requires Mac Plus or later and System 4.1 or later. $295. SmethersBarnes, 520 S.W. Harrison, Suite 4345, Portland, OR 97201. (800) 237-3611. (Aug '89)

NEW FROM THE PUBLISHERS OF CRYSTAL QUEST!

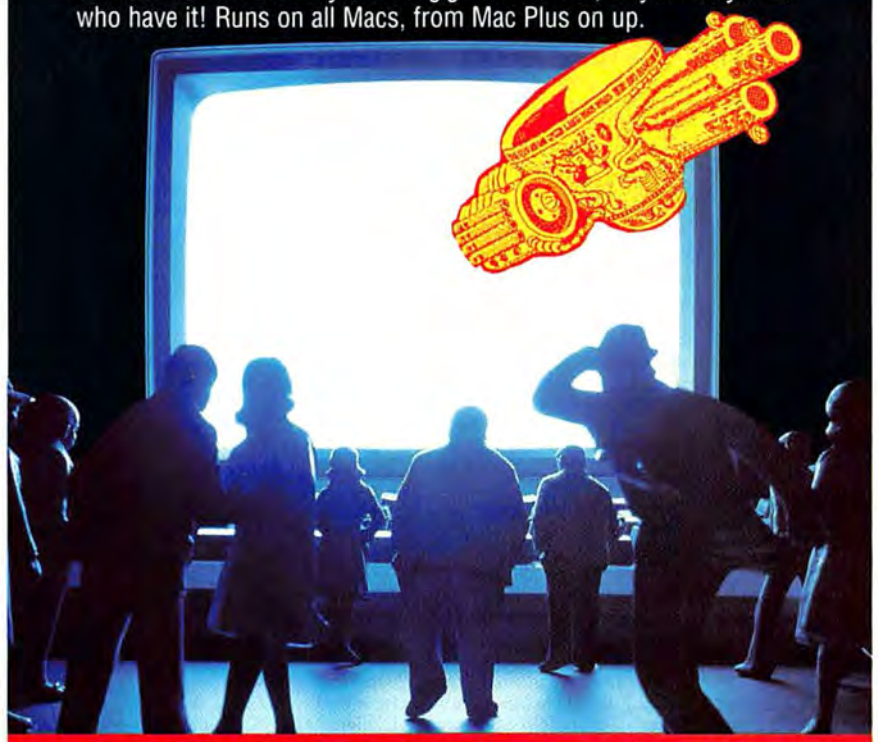


MISSION STARLIGHT

Mission Starlight combines three different kinds of gameplay. ROLL around the evil Aalgezys as they try to destroy you, SWOOP over planet surfaces to pilot your star fighter around more creatures and ZOOM down the last tunnel for the final battle. Watch out for the canons! The color 3D graphics are stunning, the game is fun and all kids love it! What more could you ask for? Runs on all Macs from the Mac Plus on up. Quitting Mission Starlight is mission impossible!

SKY SHADOW

Crystal Quest's author, Patrick Buckland, has done it again! He's written a shoot-everything-that-moves game, but don't nuke your own city and watch out for the little tents with red crosses on them and don't forget to pick up the goodies in the sky like the invulnerability icon. Then land at home base to heal, get bonus points and load more bombs. The graphics, silly sounds and fast-paced gameplay combine to form one very addicting game. In color, for you lucky folks who have it! Runs on all Macs, from Mac Plus on up.



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QUED/M ★★★★½

QUED/M stands for Quality Editor with Macros. Powerful macros and searching capabilities. Programmers can edit a program and use the built-in switching capability to load the compiler. Supports ten Clipboards. Syntax for building search-and-replace patterns feels awkward to users unfamiliar with UNIX or grep. Version 2.07. $119. Paragon Concepts, 990 Highland Drive, Suite 312, Solana Beach, CA 92075. (800) 922-2993 or (619) 481-1477. (Feb '90)

SuperExpert ★★½

SuperExpert is an expert-system shell that induces rules from examples. Rules become unwieldy when many criteria and examples are used. Pricey for what you get. Version 1.4. Requires Mac 512KE or later. $199.95. Softsync, Inc., 162 Madison Ave., New York, NY 10016. (212) 685-2080. (July '88)

Visual Interactive Programming ★★★★

Visual Interactive Programming is a unique visual programming system for creating simple Mac applications. Programs are constructed in a flowchart-type manner. Easy access to most Toolbox routines. Translators are available for THINK C, THINK Pascal, Turbo Pascal, MPW C, and MPW Pascal. Extensions are available for Grid Manager, Speech Manager, Matrix Manager, Advanced Manager 1, and Telecommunications Manager. Version 2.5.1. $149.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. (818) 991-6540. (June '87)



UTILITIES

After Dark ★★★★½

After Dark is the excellent screen saver that introduced the concept of modules. A steady stream of interesting modules, including Puzzle, have been released. Although the first version had some minor bugs, the current version is fine. Version 1.01 Requires Mac 512KE or later. $39.95. Berkeley Systems, Inc., 1700 Shattuck Ave., Berkeley, CA 94709. (415) 540-5535. (Apr '90)

Anti-Virus Kit ★★★½

Anti-Virus Kit is an antivirus utility that comes in three parts: an alert INIT, an application that installs a history file on any disk that records changes to that disk, and an application that helps identify the time an infection occurred. Doesn't have repair capabilities. Version 1.0. Requires Mac 512KE and System 4.1. $79.95. 1stAid Software, 42 Radnor Road, Boston, MA 02135. (617) 782-4676. (Oct '89)

AutoSave 2 ★★★

AutoSave 2 provides insurance against system crashes. It saves your work automatically at intervals from 1 to 99 minutes. Compatible with many applications but not recommended for use with databases. Version 1.1. $49.95. Magic Software, 12206 Franklin St., Bellevue, NE 68005. (800) 342-6243. (Dec '89)

Calculator Construction Set ★★★★

Calculator Construction Set lets you build almost any sort of calculator imaginable. The finished calculators are real working DAs. Takes some effort, and you'll need to read the manual, but the results are worth it. Version 2.06. Requires any Mac. $89.95. Dubl-Click Software, 9316 Deering Ave., Chatsworth, CA 91311. (818) 700-9525. (Feb '90)

CalendarMaker ★★★★

CalendarMaker is a utility that creates a variety of calendars. Many people use it to create personal calendars. Excellent printing routines. Version 3.3. Requires Mac 512K or later and System 4.1 or later. $49.95. CE Software, P.O. Box 65580, West Des Moines, IA 50265. (515) 224-1995. (Sept '89)

Comment ★★★★

Comment is an electronic version of Post-it notes. A mini word processor lets you attach notes to a spreadsheet cell, to words in a text document, or to a window on the desktop. Version 2.2. Requires Mac 512KE or later. $99.95. Deneba Software, 3305 N.W. 74th Ave., Miami, FL 33122. (305) 594-6965. (Dec '88)

Copy II Mac ★★★★

Copy II Mac is a collection of powerful yet easy-to-use disk utilities with disk-copying abilities and much more. Version 7.2. Requires Mac 512K or later. $39.95. Central Point Software, 15220 N.W. Greenbrier Parkway, #200, Beaverton, OR 97006. (503) 690-5162. (Mar '89)

Desktop Help for Excel ★★★★

Desktop Help for Excel is a DA that gives you context-sensitive help for Excel 2.2. It's much more extensive and better than Excel's own Help file. You won't be told to go look it up in the manual. Version 2.2. Requires Mac Plus or later. $79.95. Help Software, 10659A Maplewood Road, Cupertino, CA 95014. (408) 257-3815. (Mar '90)

DiskExpress ★★★★★

DiskExpress optimizes hard-disk-drive performance by reorganizing fragmented files. Best of its kind. Version 1.5. Requires Mac 512K. $89.95. ALSoft, Inc., P.O. Box 927, Spring, TX 77383-0927. (713) 353-4090. (Jan '89)

Electric Dvorak ★★★★★

Electric Dvorak is the best Dvorak implementation for the Mac. The basic program is an installer that puts the small (3K or so) necessary resources into your System file. Once that's done, you can toggle between the standard key mapping and a Dvorak arrangement with a keyboard command equivalent. Either keyboard can be set as the default startup arrangement. The documentation, which is all electronic, is brief but excellent. A small chart of the Key-Caps layout is provided as well. Version 1.0. Free. Tom Phoenix, Box 265-ed, Portland, OR 97207-0265. (Aug '90)

Freedom of Press ★★★★

Freedom of Press lets you print PostScript-quality output on non-PostScript printers. Limited to LaserWriter Plus font set. Process is slow and creates large PostScript files, but output is nearly indistinguishable from true PostScript printer output. $495. Version 2.1a. Requires Mac SE/30 or II series and a hard-disk drive. Custom Applications, Building 8, 900 Technology Park Drive, Billerica, MA 01821. (800) 873-4367 or (508) 667-8585. (Jan '90) ★'89 Eddy

Hot Keys (MacWrite II version) ★★★½

Hot Keys (MacWrite II version) is a set of MacroMaker macros for MacWrite II (versions for Works and PageMaker are also available). Includes utility macro software and a keyboard overlay. Works well and contains many useful macros (some for the Finder as well). Version 1.0. Requires System 6.0.2 or later, MacroMaker (included), and extended keyboard. $44.95 per version. K.I.S.S. (Keep It Simple Software), 324 Fuller, Suite C-3, Helena, MT 59601. (406) 442-3559. (Jan '90)

Icon-It! ★★★★½

Icon-It! lets you create icons to use as alternatives to menu commands. Use its 100 icon templates, or create your own. Version 2.0. $89. Tactic Software, 13615 S.W. 128th St., Miami, FL 33186. (305) 378-4110. (Feb '88)

Image Grabber ★★★★½

Image Grabber is a DA screen-capture program that is like an improved version of the old Camera DA. Can capture pulled-down menus and convert 8- and 24-bit-color screens to 2-bit black-and-white files, which saves huge amounts of memory. It has real-time and delay modes and captures in MacPaint and PICT formats. Version 2.0. Requires Mac Plus or later; System 6.0.3 or later. $90. Sabastian Software, P.O. Box 70278, Bellevue, WA 98007. (206) 861-0602. (May '90)

Mail Rater ★★★★

Mail Rater is a large HyperCard stack that takes all the guesswork out of postage. It should pay for itself in a very short time. Includes HyperCard. Version 1.01. Requires Mac Plus or later, HyperCard 1.2.2 or later, and a postage scale. $49.95. Tight Line Software, 27601 Forbes Road, Suite 50, Laguna Niguel, CA 92677. (714) 367-0007. (Feb '90)

MasterJuggler ★★★★★

MasterJuggler is Font/DA Juggler with so many features added that they can't be listed here. A world-class utility. Not as elegant as Suitcase II but has more features. Version 1.5. Requires Mac 512K or later. $89.95. ALSoft, Inc., P.O. Box 927, Spring, TX 77383-0927. (713) 353-4090. (Mar '89)

MathCAD ★★★★

MathCAD is a solid, if somewhat quirky, math processor for equation solvers. The program can also create charts, although its data-handling ability is somewhat limited for that use. Data entry needs to be improved and made more Mac-like. Version 2.02. Requires Mac Plus or later. $495. MathSoft, One Kendall Square, Cambridge, MA 02139. (800) 628-4223. (Apr '90)

MockPackage + Utilities ★★★★½

MockPackage + Utilities is a set of extremely powerful DAs. Includes a text editor, text printer (supports LaserWriter), charter, terminal, several other useful tools, and EZmenus. Version 4.4. $49.95. CE Software, P.O. Box 65580, West Des Moines, IA 50265. (515) 224-1995. (Mar '87)

Partner ★★★★½

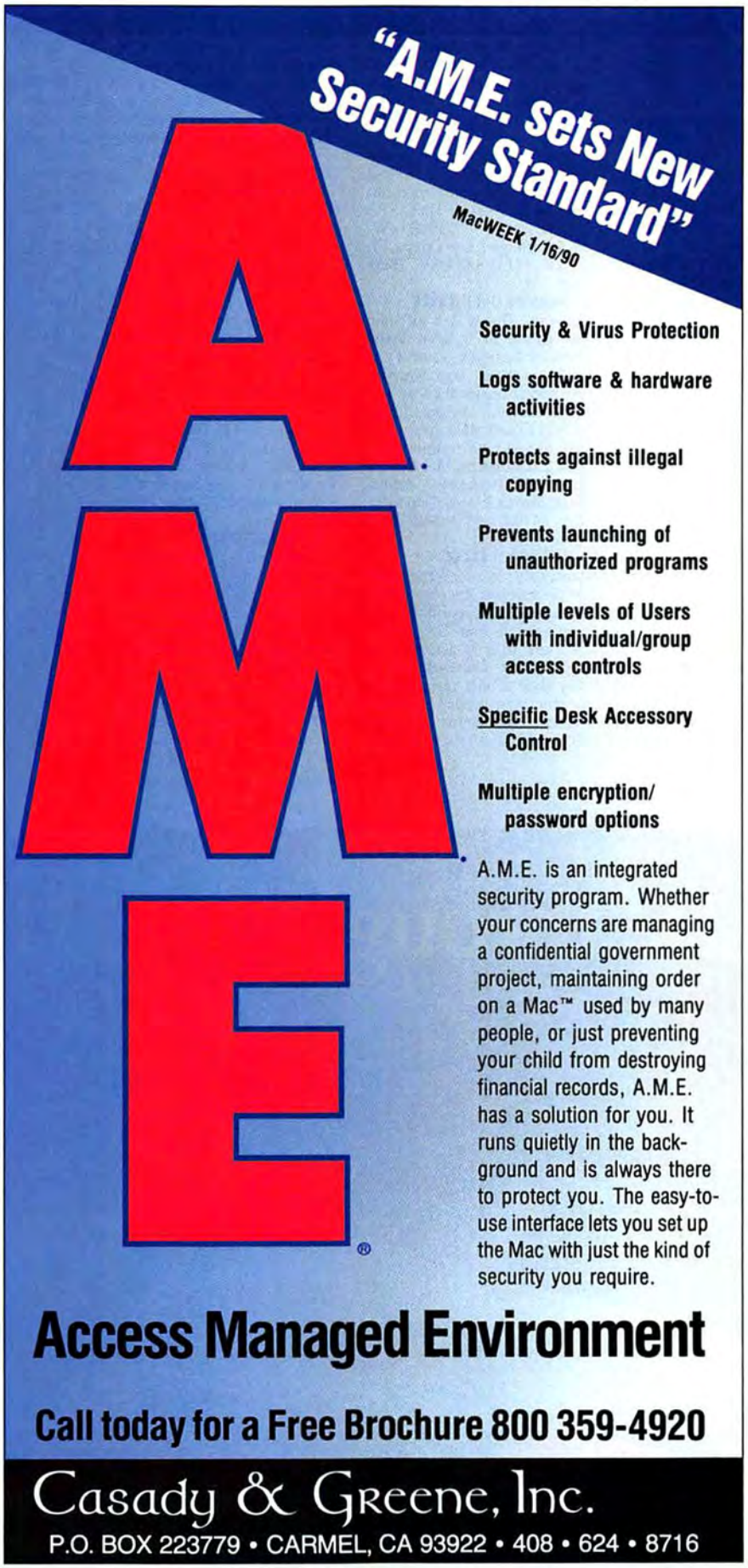
Partner is an INIT that lets you uses graphics-editing applications while using a DTP program such as MacWrite II, Word, PageMaker, QuarkXPress, MacDraw, MacDraw II, Illustrator, FreeHand, FreePaint, SuperPaint, and Canvas. Version 1.0. Requires Mac Plus or later. $99. Salient, 3101 Avalon Court, Palo Alto, CA 94306. (415) 852-9567. (May '90)

Pyro! ★★★★½

Pyro! is the premier Mac screen saver. All the required settings are found in the Control Panel. Current version features modules such as Aquarium and Flashlight. Version 4.0. Requires Mac 512K or later and System 6.0.2 or later. $39.95. Fifth Generation Systems, 10049 N. Reiger, Baton Rouge, LA 70809. (800) 873-4384. (Sept '89)

QuicKeys ★★★★

QuicKeys lets you make full use of your keyboard. Assign



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any command (menu choices, DAs, etc.) or series of text blocks and/or commands to any key or key combination. Enormously powerful; necessary for Apple Extended Keyboard owners. Version 1.2. Requires Mac 512K or later. $99.95. CE Software, P.O. Box 65580, West Des Moines, IA 50265. (515) 224-1995. (Jan '88) ★'87 Eddy

SAM (Symantec AntiVirus for Macintosh) ↕↕↕↕↕

SAM (Symantec AntiVirus for Macintosh) version 2.0 is a clear step forward in virus protection. The most significant new feature is an easy upgrade procedure that lets users upgrade SAM to fight new viruses by calling Symantec's 24-hour Virus Newsline. The INIT portion, SAM Intercept, has been improved slightly, although its interface has suffered a bit in the process. Virus Clinic (the batch-checking application) now sports a better interface and some new power. Version 2.0. $99.95. Symantec, 10201 Torre Road, Cupertino, CA 95014. (408) 253-9600. (Aug '90)

Screen Gems ↕↕↕↕

Screen Gems is a package of five color utilities for Mac II owners. Color Desk puts art onto your desktop, Dimmer dims the screen when the Mac is inactive, and Switch-a-Roo lets users switch between any two color modes instantly. Globe is a neat demo, and TN-3 lets you customize the Finder's Color menu. Version 1.0. Requires Mac II with 2 megabytes, a color monitor, and System 4.2 or later. $79. Microseeds, 7030-B W. Hillsborough Ave., Tampa, FL 33634. (813) 882-8635. (Sept '89)

Stepping Out II ↕↕↕↕↕

Stepping Out II is a software alternative to a large-screen monitor. Lets you create a virtual screen (as large as memory allows) inside the Mac's 9-inch screen. Automatically scrolls to new document position as you type or draw. Version 2.0. Requires Mac Plus or later. $95. Berkeley Systems, 1700 Shattuck Ave., Berkeley, CA 94709. (415) 540-5535. (Oct '88)

Suitcase II ↕↕↕↕↕

Suitcase II is even better than its predecessor. Increased file-management capabilities let you open 99 font, DA, sound, or Fkey files at a time. Can display any installed font in any style. Fonts can also appear in their proper typefaces on the font menus. Includes Font Harmony for resolving font-ID conflicts, and Font & Sound Valet for font and sound compression. Version 1.2.6. Requires Mac 512KE or later. $79. Fifth Generation Systems, 10049 N. Reiger, Baton Rouge, LA 70809. (800) 873-4384. (June '89) ★'87 Eddy

SUM II ↕↕↕↕↕

SUM II is an upgraded and expanded version of the essential SUM data-recovery utility. Includes utilities for partitioning, encrypting, backing up (based on Redux), and optimizing. None of these modules is preferable to the dedicated packages available, but they all work. The recovery module is still excellent and has a much improved interface. Version 2.0. Requires Mac Plus or later and System 4.2 or later. $149.95. Symantec, 10201 Torre Ave., Cupertino, CA 95014. (408) 253-9600. (Dec '89)

SuperGlue II ↕↕↕↕↕

SuperGlue II is the newest and best print-to-disk program. Offers superior operation along with many nice touches, such as Glue Notes (Post-it-like notes) and One-Timer, an Fkey that makes operation immensely easier. Version 2.0. Requires System 6.0 or later. $119.95. Solutions, Inc., 30 Commerce St., Williston, VT 05495. (802) 658-5506. (Nov '89)

Tablecloth ↕↕↕

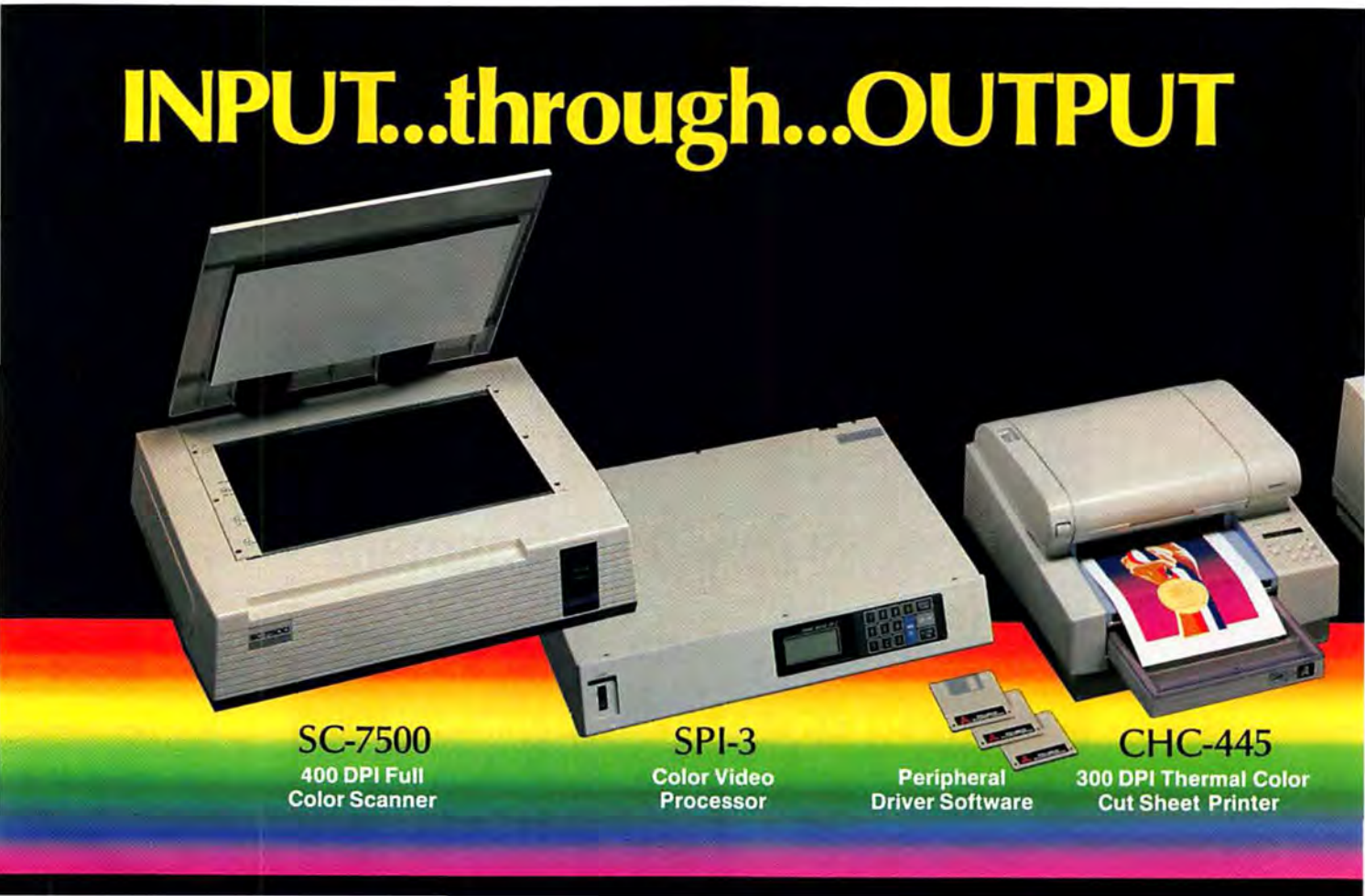
Tablecloth is a small package that makes using MultiFinder less confusing and far more pleasant. Hides all but the active window when you triple-click in the window. Version 1.0. Requires System 6.0.1 or later and MultiFinder 6.0.1. $49.95. User-Tek, 444 E. 66th St., Suite C, Tulsa, OK 74136. (800) 888-7640. (Oct '89)

Tempo II ↕↕↕↕½

Tempo II is a powerful keyboard macro program that gives owners of extended keyboards their money's worth. Especially good for building sequential macros. Features include conditional branching and the ability to remember menu selections by name. Version 1.02. $149.95. Affinity Microsystems Ltd., 1050 Walnut St., Suite 425, Boulder, CO 80302. (303) 442-4840. (Dec '88)

Tidy It Up! ↕↕↕↕½

Tidy It Up! goes into your cluttered System Folder and straightens things up visually. Where necessary, it creates dummy marker folders. Until System 7 eliminates the System Folder chaos, this is the way to keep track of everything in your System Folder. Version 1.0. Requires any Mac.



Shareware fee, $15. Guy Fiems, 77 av. Leopold III, 1970 Wezembeek-Oppem, Belgium. Also available for download on Zmac and other online services. (May '90)

Virex ★★★★★

Virex is an excellent virus preventer, detector, and eradicator that works against known viruses and has an excellent support and update history. Version 2.5. Requires Mac Plus or later and System 5.0 or later. $99.95; annual update service, $75. Microcom Software/HJC, 3700-B Lyckan Parkway, Norwood, MA 02062. (919) 490-1277. (Jan '90)

Virtual 2.0 ★★★★★

Virtual can give you as many as 14 megabytes of effective RAM. Once you start using this program, you're hooked. Its excellent performance and superb support make using it a pleasure. Version 2.02. Requires Mac IIx or later, SE/30, or Mac II with optional 68851 PMMU. $199; with PMMU chip, $275. Connectix, 125 Constitution Drive, Menlo Park, CA 94025. (415) 324-0727. (Apr '90) ★'89 Eddy

Word Wrapper ★★★½

Word Wrapper is the sort of simple utility you find useful several times a day (if you telecommunicate much). Wraps or breaks Macintosh-created text files to a user-specified length and also adds line breaks (using some intelligence) to received text files. Requires Mac 512K or later. $39.95. International Technology Development Corp., 1653 Lombard St., San Francisco, CA 94123. (415) 929-0924. (Nov '89)

WorksPlus Command ★★★★

WorksPlus Command lets you build and define macros for all Works modules. Predefined macros provide for an even tighter integration of the program's word-processing, spreadsheet, and database modules. Version 2.0. Requires Mac Plus or later and Works. $149.95. Lundeen & Associates, P.O. Box 30038, Oakland, CA 94604. (800) 233-6851. (May '88)

• Backup and File Recovery

AutoBack ★★★★

AutoBack creates copies of non-backed-up data files on another hard disk (or on selected tape drives) whenever you save a file or activate AutoBack. Applications and System files are not backed up. You can set AutoBack to back up only selected files. Your options as to what to back up and what not to are a bit too limited, though. Performance is very good. Version 1.31. $99. Soft Trends, 2243 Pacific Ave., Suite B101, Costa Mesa, CA 92627. (714) 650-2158. (Aug '90)

Cat•Back ★★★½

Cat•Back combines disk cataloging and backup. The cataloger is as good as they come, but the backup portion needs some improvement. Backing up from one partition to another on the same drive crashed the program. Other backup performance was OK. Incremental (which Cat•Back calls archival) and mirror-image backups can be made. The interface and overall operational procedure need some polishing. Version 1.1. $39.95. Master Manufacturing, 118 N. Cypress St., La Habra, CA 90631. (213) 694-6861. (Aug '90)

Complete Undelete ★★★★★

Complete Undelete is a superb file-recovery program. Excellent interface, very fast, and capable of recovering even some partially overwritten files. It pays for itself very quickly. Get it. Version 1.0. Requires Mac 512KE or later and System 5.0 or later. $49.95. 1st Aid Software, 42 Radnor Road, Boston, MA 02135. (617) 782-4676. (Jan '90)

Fastback II ★★★★

Fastback II supports incremental and differential backups and offers a choice of compression levels. Backup configurations can be saved as preference files. Macro language supports automated procedures. Nonstandard dialog boxes are occasionally unclear. Version 2.01. Requires Mac 512KE or later and System 4.2 or later. $189. Fifth Generation Systems, 10049 N. Reiger Road, Baton Rouge, LA 70809. (504) 291-7221. (Oct '89)

1stAid Kit ★★★★½

1stAid Kit recovers lost or damaged files from floppy or hard-disk drives. An excellent manual-turned-textbook actually teaches HFS. Version 2.8. Requires Mac Plus or later. $99.95. 1stAid Software, 42 Radnor Road, Boston, MA 02135. (617) 783-7118. (June '88)

HFS Backup ★★★★

HFS Backup is a top-class backup program. Quick and very reliable. Version 3.0. $99. Personal Computer Peripherals, 4710 Eisenhower Blvd., Building A4, Tampa, FL 33634. (813) 884-3092. (Oct '89)

Redux ★★★★½

Redux is an excellent incremental-backup program. Lets

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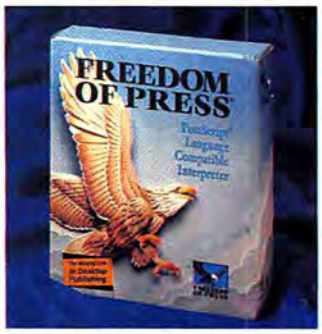
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Programs, Peripherals



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ON Technology On Location..... 75.
Peter Norton Norton Utilities..... 84.
Software Innovations
HandOff v1.1..... 31.
HandOff II..... 52.
Solutions, International
SmartScrap & The Clipper II..... 45.
Super Glue II v2.01..... 61.
SuperMac Software
SuperSpool v5.0 or Diskfit v1.5..... 58.
SuperLaserSpool v2.02 or Sentinel v2.2..... 87.
Symantec
Symantec Utilities (SUM II)..... 99.
Symantec AntiVirus (SAM)..... 67.
Synex
Mac Envelope v5..... 57.
Mac EnvelopePlus v2.0..... 159.
Vertical Solutions
FastEnvelope or FastCAT..... 50.
FastLabel v2.0..... 89.
WildFlower Software SnapJot..... 32.

Accounting

Aatrix Software
Aatrix Checkwriter II v2.8..... 35.
Absolute Solutions, Inc.
Computerized Classic Accounting..... 119.
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Computer Associates
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SoftStream
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Symantec Think C..... 165.
Think Pascal v3.0..... 165.
Just Enough Pascal..... 52.
Symmetry HyperDA..... 45.
The Result Software
Dialoger Pro. v1.5..... 85.

Modems/FAX

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InterFax 24/96..... 419.
Anchor Automation MacPac 2400E. 169.
Applied Engineering
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Shiva NetModem V2400..... 425.
NetModem v.32 (9600 BPS)..... 1429.
Supra Corporation
Supra Modem 2400..... 119.
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Utility Software

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Affinity Microsystems
Tempo II v1.02..... 93.
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Stuff It Deluxe..... 63.
ALSoft
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Power Chute..... 67.
Berkeley System Design
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OmniProof, Spell or Trace..... 105.
Omnipage..... 539.
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Fifth Generation Systems
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Suitcase II..... 43.
Icom Simulations On Cue..... 35.
Insight Development MacPrint v1.2..94.
Kent Marsh NightWatch v1.03..... 85.
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Millennium Software HyperX v3.0... 65.
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Silicon Beach SuperCard v1.5..... 189.



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Computer Associates
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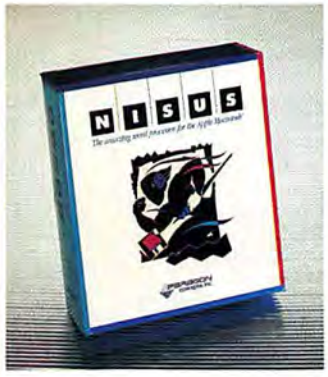
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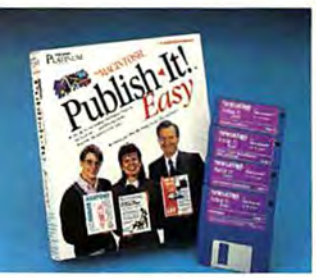
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Retrospect ⭐⭐⭐⭐½

Retrospect is a full-featured backup-and-archival package that supports storage devices from floppies to DAT drives. Version 1.1 adds significant performance for SCSI devices, most notably tape drives. Version 1.1. Requires Mac Plus and System 6.0 or later. Dantz Development, 1510 Walnut St., Berkeley, CA 94709. (415) 849-0293. (Dec '89) ★'89 Eddy

Shadow ⭐⭐⭐½

Shadow is a DA that automatically backs up selected files at specified time intervals and after specified actions. Doesn't work with all programs (Excel 2.2 in particular). Version 1.23. Requires Mac 512KE or later. $49.95. Natural Intelligence, 86 Richdale Ave., Cambridge, MA 02140. (800) 999-4649 or (617) 266-7858. (May '90)

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CanOpener ⭐⭐⭐⭐½

CanOpener searches files at a decent clip for specified strings. Can read and display text, MacPaint, PICT, EPSF, TIFF, RIFF, and MacDraw II formats. The interface looks odd but is quite easy to master. Version 1.1. Requires Mac Plus or later. $125. Abbott Systems, 62 Mountain Road, Pleasantville, NY 10570. (800) 552-9157 or (914) 747-3116. (Feb '90) ★'89 Eddy

Disk Doubler ⭐⭐⭐⭐½

Disk Doubler is an INIT that adds a menu with file-compression and -expansion options to all your applications. It is very efficient and generally compresses files smaller than StuffIt does. Includes an application that lets compressed files be expanded with a double-click. The ability to read StuffIt files is promised for an upcoming version. Version 1.0. $59.95. Salient, 3101 Avalon Court, Palo Alto, CA 94306. (415) 852-9567. (July '90)

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DiskFinder ⭐⭐½

DiskFinder searches disks for files and also catalogs disks. Version 1.07. Requires Mac 512KE or later. $49.95. Williams & Macias, S. 3707 Godfrey Blvd., Spokane, WA 99204. (800) 752-4400. (Feb '89)

DiskTools Plus ⭐⭐⭐⭐⭐

DiskTools Plus is a set of eight useful DAs and applications. The Disk Tools II DA is a Finder replacement. Also includes an RPN calculator, Phone Pad, and Calendar Manager. Version 1.03. Requires Mac 512K or later. $49.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. (415) 572-2787. (Mar '88)

DiskTop 4.0 ⭐⭐⭐⭐⭐

DiskTop is the best Finder-replacement DA. It's very easy to use and very powerful and has an excellent interface. The Find function's multiple options are unmatched, and it's very fast. It can launch applications and perform batch copies and moves. Version 4.0. Requires Mac Plus or later. $99.95. CE Software, P.O. Box 65580, West Des Moines, IA 50265. (515) 224-1995. (June '90)

FetchIT ⭐⭐⭐⭐½

FetchIT is an INIT that puts a pop-up menu onto the small disk icon on the right side of the Open and Save dialog boxes. This menu can be used to navigate your disks or do other Finder-type operations. Performance is good. Although you lose the ability to move up a directory level by simply clicking on the icon, you gain far more in return. Version 2.01. Requires Mac Plus or later. $25. CRA Z Software, P.O. Box 6379, Haverhill, MA 01831. (508) 521-5262. (June '90)

Findswell ⭐⭐⭐⭐⭐

Findswell is an indispensable utility that installs a new button in the Open dialog box of virtually every Mac application. Press the button, type a search string, and click on Find, and Findswell searches for any files that match. Click on Open, or double-click to open the correct file. Version 2.0. Requires Mac 512K or later. $59.95. Working Software, P.O. Box 1844, Santa Cruz, CA 95061. (408) 423-5696. (Nov '87) ★'87 Eddy

HandOff ⭐⭐⭐⭐½

HandOff solves the annoying problem of not having the exact application to open a document. It lets you specify, for example, that Word should open all documents created by MacWrite. Slick. Version 1.1. Requires Mac Plus or later. $49.95. Software Innovations, P.O. Box 811, Allen, TX 75002. (214) 727-2329. (Feb '90)

INITPicker ⭐⭐⭐⭐½

INITPicker offers a scrollable list of INITs in the System to let you determine their loading order. Holding down a predetermined key combination at startup automatically shuts off all INITs and bypasses the INITPicker screen. Version 1.01. Requires Mac Plus or later. $49. Microseeds, 7030-B W. Hillsborough Ave., Tampa, FL 33634. (813) 882-8635. (Aug '89)

Inix ⭐⭐½

Inix is a combination INIT and DA that lets you choose separate startup sets. It does not let you decide to turn off a set temporarily (until the next startup), and it lacks the "run all" or "skip all" commands found in Aask and INITPicker. Version 1.1. Requires Mac 512K or later. $49.95. Natural Intelligence, 86 Richdale Ave., Cambridge, MA 02140. (617) 266-7858. (Aug '89)

MacTREE Plus ⭐⭐⭐½

MacTREE Plus displays your files in the form of a hierarchical tree. Can't view tree easily. Good search function. Version 2.0. Requires Mac 512K or later. $69.95. Go Technology, 918 Northwood Blvd., Second Floor, Incline Village, NV 89450. (702) 831-3100. (Apr '88)

MultiDisk ⭐⭐⭐⭐

MultiDisk is an excellent software disk partitioner that allows partitions to be resized dynamically, password-protected, and even encrypted. Version 1.2. Requires Mac 512K or later. $69.95. ALSoft, Inc., P.O. Box 927, Spring, TX 77383-0927. (713) 353-4090. (May '89)

On Cue ⭐⭐⭐⭐½

On Cue lets you switch applications without returning to the Finder. Under MultiFinder, active applications are listed on a pop-up menu. Can also launch directly to a specific document. Version 1.3. Requires Mac 512K or later. $59.95. ICOM Simulations, 648 S. Wheeling Road, Wheeling, IL 60090. (708) 520-4440. (Sept '88)

On Location ⭐⭐⭐⭐

On Location finds files and text strings. That's it. Once it's found a file, you can view the contents (for most common document formats); open it in its native application; or copy, delete, rename, or move it. This is no DiskTop, though. On Location's main asset is blazing speed, which it gets from the index file it builds on your hard disk at installation. The index is updated either automatically or on command, and you can move the index file and use it on another disk if you wish. Mac purists will cringe at On Location's nonstandard interface. Expensive for a one-trick utility, but the publisher offers a one-year money-back guarantee. Version 1.0. Requires Mac Plus and a hard-disk drive. $129.95. ON Technology, One Cambridge Center, Cambridge, MA 02142. (617) 225-2545. (Aug '90)

POWERicons ⭐⭐⭐⭐

POWERicons creates duplicate icons for applications to make hard-disk-drive organization easier and more efficient. POWERicons can also be created to open sets of frequently used icons by double-clicking. Version 1.03. Requires System 4.2 or later. $79.95. Magic Software, 1602 Cascio Drive, Bellevue, NE 68005. (800) 342-6243 or (402) 291-0670. (Feb '90)

POWERmenus ⭐⭐⭐⭐⭐

POWERmenus is two products in one. The first allows full access to menus from anywhere on-screen. The second, called Gadgets, includes a phone dialer; notepad; and useful application, DA, and Control Panel-item launchers. Version 1.03. Requires System 5.0 or later. $79.95. Magic Software, 1602 Cascio Drive, Bellevue, NE 68005. (402) 291-0670. (Jan '90)

PowerStation ⭐⭐⭐⭐⭐

PowerStation is an extremely easy to use, versatile, and powerful Finder substitute. Loaded with powerful features. Version 2.5.2. $59.95. Fifth Generation Systems, 10049 N. Reiger, Baton Rouge, LA 70809. (800) 873-4384. (Dec '87)

Sector Collector ⭐⭐⭐⭐

Sector Collector is a small utility that scans your disks, looking for bad or marginal media. It collects these problem areas in a file so they aren't used for other storage. It can eventually prevent you from losing files due to bad disk media. Version 1.0. Requires Mac 512KE or later and System 4.2 or later. $49.95. 1stAid Software, 42 Radnor Road, Boston, MA 02135. (617) 783-7118. (Feb '90)

SilverLining ⭐⭐⭐⭐½

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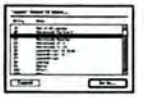


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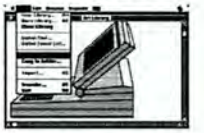


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hard-disk-utility set. It has the best disk-partitioning software available and can format most hard-disk drives. It also has powerful and safe optimizing and testing features. Excellent performance. Also includes DS Backup, acceptable backup software, and a nice disk duplicator. Version 5.22. Requires Mac Plus and SCSI device. $99.95. La Cie, 16285 S.W. 85th, Suite 306, Tigard, OR 97224. (503) 684-0143. (Jan '90)

StuffIt ⭐⭐⭐⭐⭐

StuffIt can compress files to reduce the amount of space they occupy on-disk. Great for transferring documents via modem. Also joins and encrypts files. Version 1.5.1. Requires Mac 512KE. Shareware fee, $25. Aladdin Systems, Inc., Deer Park Center, Suite 23A-171, Aptos, CA 95003-4723. (408) 685-9175. (Dec '88)

XTreeMac ⭐⭐

XTreeMac is a file-management utility that uses a file-card metaphor. Can recover deleted files, and supports filters for grouping specified types of files. Not for network use. Buggy. Version 3.0. Requires Mac 512KE or later and System 4.2 or later. $99. XTree Co., 4330 Santa Fe Road, San Luis Obispo, CA 93401. (805) 541-0604. (Sept '89)

• PRINTING

Grappler Spooler ⭐⭐⭐

Grappler Spooler is an adequate spooler but no speed demon. Installation is simple, and there are few problems, but sometimes using it is slower than not using a spooler. It lacks laser-printer support. Version 1.0. Requires Mac Plus or later and QuickDraw printer. $79. Orange Micro, 1400 N. Lakeview Ave., Anaheim, CA 92807. (714) 779-2772. (Apr '90)

JetLink Express ⭐⭐⭐

JetLink Express is a printer driver that lets you print to non-PostScript HP printers. Provides a set of four special outline fonts that it automatically uses when you choose the standard Adobe fonts. Includes cable. Terrible manual. Check application compatibility before buying. Version 1.1. Requires Mac Plus; System 6.0 or later; hard-disk drive; 512K printer memory (1 megabyte recommended); and LaserJet IID, LaserJet II series, LaserJet Plus, DeskJet Plus, DeskWriter, DeskJet, or HP-compatible printer. $149; additional fonts, $198. GDT Softworks, P.O. Box 1865, Point Roberts, WA 98281-1865. (604) 291-9121. (Jan '90)

LaserServe ⭐⭐⭐⭐⭐

LaserServe is a printer spooler for AppleTalk networks. After installation, all operations are done with a DA. Works with MacServe and TOPS. Version 2.1. Requires Mac 512K or later. $95 per node; 5-pack, $295. Infosphere, 4730 S.W. Macadam Ave., Portland, OR 97201. (503) 226-1407. (Feb '87)

MacPrint ⭐⭐⭐

MacPrint is a printer driver that lets you print to non-PostScript HP printers. Provides screen fonts for every imaginable HP font cartridge and special Compugraphic screen fonts. Good manual. Check application compatibility before buying. Version 1.2. Requires Mac Plus; System 6.0; hard-disk drive; 512K printer memory (1 megabyte recommended); and LaserJet IID, LaserJet II series, LaserJet Plus, DeskJet Plus, DeskJet, or HP-compatible printer. $149. Insight Development, 2200 Powell St., Suite 500, Emeryville, CA 94608. (415) 652-4115. (Jan '90)

myDiskLabeler ⭐⭐⭐⭐

myDiskLabeler is an excellent label maker. It can use large or small icons and read directories. Comes with 54 precut labels. Version 2.9.1. L/I. $44.95; with color-printing ability (ImageWriter II), $54.95; with PostScript-font capability (LaserWriter), $64.95. Williams and Macias, Inc., S. 3707 Godfrey Blvd., Spokane, WA 99204. (800) 752-4400. (Aug '87)

PrintBar ⭐⭐⭐⭐½

PrintBar calculates and prints bar codes at varying resolutions. It supports UPC, EAN, 2 of 5, and Code 39. You get the application and the necessary fonts, including printer and screen fonts where required. Operation is a bit clunky, but performance is fine. Output is easily transferable. Version 2.0. Four volumes (for different codes), $225 each; discounts for buying multiple volumes. Bear Rock Software, 6069 Enterprise Drive, Diamond Springs, CA 95619. (916) 622-4640. (June '90)

Printworks for the Mac ⭐⭐⭐⭐

Printworks for the Mac is a complete software-based dot-matrix-printer control system. Optimizes printing from different applications and is easy to use. Requires Mac 512K or later. Dot-matrix-printer



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version 3.5, $75; laser-printer version 3.6, $145; daisywheel version 3.5, $95. Phoenix Technologies, 6600 Kalanianaole Highway, Honolulu, HI 96825-1215. (808) 396-6368. (Aug '87)

SuperLaserSpool ★★★★

SuperLaserSpool supports the widest range of printers (it's the only spooler to support the DeskWriter) and has generally excellent performance. The program's installation is a snap, and use is mostly transparent. SuperMac's support is excellent. Version 2.02. Requires Mac Plus or later. $149.95. SuperMac Technology, 485 Potrero Ave., Sunnyvale, CA 94086. (408) 245-2202. (Apr '90)

SuperSpool ★★★½

SuperSpool is the simpler of the two SuperMac spoolers. It's often slightly quicker than SuperLaserSpool. Excellent support. No laser-printer support. Version 5.0. Requires Mac Plus or later and QuickDraw printer. $99.95. SuperMac Technology, 485 Potrero Ave., Sunnyvale, CA 94086. (408) 245-2202. (Apr '90)

TScript ★★★½

TScript, like Freedom of Press, makes non-PostScript printers PostScript-compatible. It also lets you preview EPSF files and PostScript code. If you apply some effects to any font other than Times, Helvetica, or Courier, the eventual printed output can suffer from the jaggies. Speed is good. Limited capabilities make it preferable to Freedom of Press only for those on a tight budget. Version 1.2. $145. TeleTypesetting, 474 Commonwealth Ave., Boston, MA 02215; (617) 734-9700. (Aug '90)

• SECURITY

Advanced Security ★★★★

Advanced Security consists of three applications: File Security, which can automatically protect your work; HD Security, which locks hard disks so they can be opened only by a special floppy; and Virus Security, which simply checks itself for changes when it's run. Virus Security lacks real value these days. HD Security is fine as long as nothing happens to the floppy disk. Version 1.2. Requires Mac Plus or later. Single-user version, $149.95; multiuser versions available. Advanced Gravis Computer Technology, 1602 Carolina St., Suite D12, Bellingham, WA 98226. (800) 937-0062 or (604) 434-7274. (May '90)

DiskLock ★★★½

DiskLock has two parts: an INIT and an application called FolderLock. It has standard locking features and is controlled by a DA. DES is not supported. This is basic security, neither great nor awful. Version 1.0.1. Requires Mac Plus or later. $189. Fifth Generation Systems, 10049 N. Reiger, Baton Rouge, LA 70809. (800) 873-4384. (May '90)

FileGuard ★★★★½

FileGuard is a cdev that operates primarily in the background. It offers varying levels of access and very intelligent controls. It is unique in that it can protect applications as well as data. Overall, it is an excellent security tool. Version 2.0.2. Requires Mac Plus or later. $249. ASD Software, 4650 Arrow Highway, G-21, Montclair, CA 91763. (714) 271-9913. (May '90)

Ft. Knox ★★★★½

Ft. Knox offers a nice mix of security utilities. Supports two forms of encryption, and files or volumes can be "sanitized" to U.S. top-secret standards. Version 1.05. Requires Mac 512K or later. $195. Transfinite Systems Co., P.O. Box N, MIT Branch Post Office, Cambridge, MA 02139-0903. (617) 969-9570. (Nov '89)

MacSafe ★★★★

MacSafe is a data-file-security program that lets you place multiple files into a "safe," where you can further protect them through two types of encryption (including DES). Flexible and very easy to use. Allows for installation on hard-disk drive. Version 2.0. $149.95. Kent Marsh Ltd., 1200 Post Oak Blvd., Suite 210, Houston, TX 77056. (800) 325-3587. CP (Mar '87)

NightWatch ★★★

NightWatch locks up your hard-disk drive by using a floppy startup disk that acts as a key. Type in the correct password, and access to the hard-disk drive is allowed. Version 1.03. Requires Mac 512KE, a hard-disk drive, and an 800K drive. Mac II and MultiFinder friendly. $149.95. Kent Marsh Ltd., 1200 Post Oak Blvd., Suite 210, Houston, TX 77056. (800) 325-3587. (Sept '88)

SecureInit ★★★★

SecureInit is a well-thought-out program that can lock files and folders, make the System Folder invisible, erase files not on its user-specified approved list, lock disks after use, refresh (replace) specified files with clean copies after use, and password-protect everything. It can also purge files as a disk fills up, but this is too dangerous a feature to use in most cases. SecureInit is particularly good at resisting efforts to bypass it. Version 2.2. $99.95. Direct Software, 1032 Irving St., Suite 513, San Francisco, CA 94122. (415) 347-1590. (Aug '90)

Sentinel ★★★★

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sets of files), using a super-secure DES or a superfast SuperCrypt algorithm. Provides high-level security if you can keep your passwords secret. Version 2.0. Requires Mac 512KE or later. $149. SuperMac Technology, 485 Potrero Ave., Sunnyvale, CA 94086. (408) 245-2202. (Apr '88)



VIDEO

ColorBoard 264 ★★★★½

ColorBoard 264 is a relatively low-cost video board that has 32-bit capability and good performance. One of the cheapest ways to get 16.7 million colors on your Mac. Requires Mac II series or SE/30 and System 6.0.3 or later. NuBus version, $995; SE/30 version, $1,295. RasterOps, 2500 Walsh Ave., Santa Clara, CA 95051. (408) 562-4200. (Feb '90)



WORD PROCESSING

BulkMailer+ ★★★½

BulkMailer+ is a basic mail manager that contains many powerful sorting features. Although it's a fine program, port setup can be a bit difficult. Can handle up to 9,600 names and addresses. Version 3.25. Requires Mac Plus or later. $350. Satori Software, 2815 Second Ave., Suite 560, Seattle, WA 98121. (206) 443-0765. (Oct '89)

DocuComp ★★★

DocuComp lets you compare two versions of a word-processing document. Displays inserted text in the newer document with underlining and moved text in boldface. Older document shows deleted and moved text with strikeout characters. Excellent reporting feature details all revisions made to a document. Supports text, WordPerfect, WriteNow, and Word formats. Version 1.3. Requires Mac 512KE or later; System 4.1 or later; and WordPerfect, WriteNow, or Word; hard-disk drive recommended. $159.95. Advanced Software, 1095 E. Duane Ave., Suite 212, Sunnyvale, CA 94086. (800) 346-5392 or (408) 733-0745. (Dec '89)

EndNote ★★★★½

EndNote provides database management for bibliographies. It's designed to work in conjunction with a word processor. Allows for formatted in-text citations to be pasted directly into a word-processing document and then creates a bibliography from the citations. Version 1.2.1. $129. Niles & Associates, 2000 Hearst St., Berkeley, CA 94709. (415) 655-6666. (Feb '89)

Letter Writer Plus ★★★★½

Letter Writer Plus used to be known as ExpressWrite. It's been spiffed up, and new mail-merge and graphics features have been added. It can use Address Book Plus files as well as text, comma, and tab-delimited files. The interface of this large DA has a rough edge or two, but it is the best letter and memo DA available. Version 1.0. Requires Mac Plus or later. $89.95. PowerUp Software, 2929 Campus Drive, San Mateo, CA 94403. (415) 345-5900. (May '90)

LetterWorks ★★★★

LetterWorks is a large book of sample letters in text format on-disk. There's a letter for everything here. In some cases, the letters need a lot of modification. Requires a word processor. $79.95. Round Lake Publishing, 415 Main St., Ridgefield, CT 06877. (203) 438-5255. (Mar '90)

Mac Envelopes Plus ★★★★★

Mac Envelopes Plus is the best envelope and mailing-list program available. It's intended for small-business and group users who do substantial mailing. It can print bar codes and FIMs automatically, sort and report by zip code or carrier routes, and do everything necessary so that your mailings can qualify for the lowest bulk- and regular-mail rates. Operation is fast and very, very slick. Includes a nice DA so envelopes can be printed on the fly from within other applications. Version 2.0. $350. Synex, 692 Tenth St., Brooklyn, NY 11215-4502. (718) 499-6293. (Aug '90)

MacProof ★★★★

MacProof has been around for a long time. The latest incarnation is the best so far. It's still a DA. Its rule set isn't as good as that of some of its competition, notably Correct Grammar, but it is still a good choice for many users. Excellent interactive interface and analysis tools. Price is extremely high. Version 3.2.1. Requires Mac Plus, 2 megabytes, and hard-disk drive. $195; French and German editions, $229 each. Lexpertise USA, 175 E. 400 South, Suite 1000, Salt Lake City, UT 84111. (800) 354-5656. (Aug '90)

MarkUp ★★½

MarkUp is a multiuser editing tool that just doesn't click. The idea is great, but performance isn't up to snuff. It does offer excellent security and organizational functions, however. Version 1.01. Requires Mac Plus or later. Single user, $245; two users, $495; five users, $995. Mainstay, 5311B Derry Ave., Agoura Hills, CA 91301. (818) 991-6540. (Mar '90)

MergeWrite ★★★

MergeWrite is a mail-merge program for MacWrite (also works with ASCII files). Program combines names and addresses from a data file into predefined fields in a form letter. Allows simple conditional IF/THEN/ELSE statements. $49.95. Software Discoveries, 137 Krawski Drive, South Windsor, CT 06074. (203) 872-1024. (Dec '87)

Mishu ★★★★½

Mishu is a DA that turns MacWrite and Microsoft Word into a Chinese word processor. It also works with Cricket Draw, HyperCard, or any program that reads PICT files. Version 2.1. Requires Mac 512K or later, MacWrite 3.5 or later, and Word 3.0 or later. $89. Xanatech, 20 Fresh Pond Place, Cambridge, MA 02138. (617) 492-7463. (May '89)

• OCR

OmniPage ★★★★

OmniPage is a very good OCR program that can create editable text files from scanned images. It works only with certain scanners and requires a lot of memory, so be sure you can meet its requirements before you buy. Version 2.1. Requires Mac II and 4 megabytes. $795. Caere, 100 Cooper Court, Los Gatos, CA 95030. (800) 535-7226. (Mar '89) ★'89 Eddy

Read-It! ★★★★½

Read-It! is an OCR package that includes printer drivers for most scanners, batch processing, background operation under MultiFinder, and 22 font tables. Recognizes multiple columns, italics, and some foreign characters but not underlined text. Version 2.1. Requires Mac Plus or later. $495. Olduvai, 7520 Red Road, Suite A, South Miami, FL 33143. (800) 822-0772. (June '89)

RightWriter ★★★½

RightWriter would be an excellent grammar checker if its interface were better. A port of a popular DOS product, it makes a marked-up, or commented, copy of your documents that you can then edit as appropriate in your word processor. It's an application, with no interactive mode. It's often difficult to tell to which passage RightWriter's comments refer, and you have to refer to the manual to decode some of its comments. Good rule set and analysis tools. Version 3.10. Requires Mac Plus and a hard-disk drive. $95. RightSoft, 4545 Samuel St., Sarasota, FL 34233. (800) 992-0244, (813) 923-0233. (Aug '90)

TextPert ★★★½

TextPert is a trainable OCR package. Requires less hardware than OmniPage does but is slower. Acceptable accuracy requires teaching. Supports more than 30 languages in roman fonts only. Directly supports popular scanners. Version 3.0.1. Requires Mac Plus and high-resolution (at least 200-dpi) scanner. $995. CTA, 747 Third Ave., Third Floor, New York, NY 10017. (212) 935-2280. (Oct '89)

• SPELLING AND GRAMMAR CHECKERS

Correct Grammar ★★★★½

Correct Grammar is currently the best Mac grammar checker. This rule-based application can handle a wide variety of input. The interface is good, although some of the type is too small. Customization is easy and necessary, which is true of all grammar checkers. It aggressively flags what it thinks are instances of passive voice — the original sin. Version 1.0. Requires Mac Plus or later. $79. Lifetree, 33 New Montgomery St., Suite 1260, San Francisco, CA 94105. (415) 541-7864. (June '90)

Graham Speller ★★★

Graham Speller is a DA-based spelling checker with a macro feature. Good guesser in interactive mode. Clumsy interface. Version 1.1. $44.95. Graham Software, 8609 Ingalls Circle, Arvada, CO 80003. (303) 422-0757. (Sept '88)

Grammatik Mac ★★★½

Grammatik Mac is a port from the DOS world and it shows — the interface is simply ugly and awkward. The grammar-checking abilities, which are overshadowed by the interface, are quite good. Customization is reasonably easy. Version 1.0. Requires Mac Plus or later. $99. Reference Software International, 330 Townsend St., Suite 123, San Francisco, CA 94107. (415) 541-0222. (June '90)

Language Master ★★★½

Language Master is an electronic dictionary and thesaurus in a DA. The dictionary contains definitions, hyphenation points, and part-of-speech information for more than 83,000 entries. The thesaurus has 40,000 unique entry points with synonym information for different parts of speech. Version 1.0. Requires Mac Plus or later and System 4.2 or later. $99. Franklin Software, 3511 N.E. 22nd Ave., Fort Lauderdale, FL 33308. (305) 566-3511. (Jan '90)

Lookup ★★★★★

Lookup is an on-call single-word and batch spelling checker. Designed for the way writers really work. New version can check whole documents. Controlled from a DA. Uses the 93,000-word Spellswell dictionary. Version 2.0. $59.95. Working Software, P.O. Box 1844, Santa Cruz, CA 95061-1844. (408) 423-5696. (Feb '90)

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Sensible Grammar ⧫⧫⧫
Sensible Grammar corrects some of the most common writing errors. Also analyzes the word count and sentence structure to establish a readability rating. Slow. Version 1.5.9. Requires Mac 512K or later. $99.95. Sensible Software, 335 E. Big Beaver, Suite 207, Troy, MI 48083. (313) 528-1950. (Dec '88)

Spelling Coach Professional ⧫⧫⧫⧫
Spelling Coach Professional is the biggest and most-powerful spelling checker. That doesn't automatically translate into the best, but it is very good. New features include a redesigned and much-improved Control Panel, clearer dialog boxes, greater flexibility in keyboard-command-equivalent assignments, and Deneba's Big Thesaurus — the best available. As always, Coach can check in batches or interactively. The main drawback is that it takes time and effort to learn. Version 3.1. Requires Mac Plus or later. $195. Deneba, 3305 N.W. 74th Ave., Miami, FL 33122. (800) 622-6827. (May '90)

Spellswell ⧫⧫⧫⧫½
Spellswell is a stand-alone batch spelling checker. Checks for punctuation and other errors. Good dictionary, thorough checking, and simple interface, but weak guessing. Excellent performance. Version 2.2. $74.95. Working Software, P.O. Box 1844, Santa Cruz, CA 95061-1844. (408) 423-5696. (Sept '88) ★'86 Eddy

Thunder II ⧫⧫⧫⧫⧫
Thunder II is a major upgrade of Thunder!, the popular spelling checker. Now a cdev/INIT, Thunder II launches at startup. Users select the dictionaries and applications with which it should run. Checks for spelling, punctuation, capitalization, and double-word errors. Includes application-specific "compatibility modules" to retain character formatting. Editable glossary. Version 1.1. Requires Mac Plus or later and System 5.0 or later. $79.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. (415) 571-7171. (Oct '89)

Word Finder ⧫⧫⧫½
Word Finder is an electronic thesaurus that won't replace your trusty *Roget's* but is useful for checking synonyms on the fly. Version 2.0. Requires Mac 512K or later. $59.95. Microlytics, Two Tobey Village Office Park, Pittsford, NY 14534. (716) 248-9620. (Mar '90)

WorksPlus Spell ⧫⧫⧫⧫½
WorksPlus Spell is a speedy spelling and hyphenation checker for Microsoft Works. It includes a glossary for abbreviations and time/date stamping. The biggest drawback is its limitation to one program. Version 2.0. $99.95. Lundeen & Associates, P.O. Box 30038, Oakland, CA 94604. (800) 233-6851. (Oct '87) ★'87 Eddy

• WORD PROCESSORS

FeiMa ⧫⧫⧫½
FeiMa allows users to create their own Chinese ideograms. This Chinese word processor follows the Mac interface more closely than Kaihin Brushwriter. Lets you create your own characters for those that aren't included in the dictionary. Version 4.1. Requires Mac 512K or later. $595. Wu Corp., P.O. Box 699, Avon, CT 06001. (203) 677-1528. CP (May '89)

FullWrite Professional ⧫⧫⧫⧫
FullWrite Professional combines outlining and word processing with page-layout and drawing capabilities. Its many features translate into sluggish performance unless you have a lot of extra RAM. Still, it's impressive. Version 1.1. Requires Mac Plus or later. $395. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90509-9972. (213) 329-0086. (Sept '88)

Kaihin Brushwriter ⧫⧫
Kaihin Brushwriter is a Chinese word processor that doesn't support the Mac interface. It has 8,000 characters. You must speak Chinese to use this program. Won't work with System 6.0. Version 2.0. Requires 1-megabyte SE and adapter (included) to save and print files. $599. Pacific Rim Connections, 3030 Atwater Drive, Burlingame, CA 94010. (415) 697-0911. (May '89)

MacWrite II ⧫⧫⧫⧫½
MacWrite II is MacWrite's first major upgrade and a big increase in power. Excellent interface. Powerful Search/Replace function. Elegant multiple-column and mail-merge features. With its open hooks for file translators, it's an excellent choice for mixed environments. Version 1.1v1. Requires Mac Plus or later. $249. Claris Corp., 5201 Patrick Henry Drive, Santa Clara, CA 95052. (408) 987-7000. (Mar '90)

Microsoft Word 4.0 ⧫⧫⧫⧫½
Word 4.0 is the best power word processor you can buy. Excellent speed and a huge list of useful features. Tables command lets you create multicolumn tables of text and graphics easily. Has enough DTP capabilities to format almost any document, without compromising its performance as a dedicated word processor. Requires Mac 512KE or later and System 3.2 or later. $395. Microsoft Corp., One Microsoft Way, Redmond, WA 98052-6399. (800) 426-9400 or (206) 454-2030. (July '89) ★'89 Eddy

Microsoft Write ⧫⧫⧫
Microsoft Write is a low-level word processor. Has more features than some word processors in its class, but not all of them work well. Poor value and an expensive upgrade path to Word. Version 1.0. Requires Mac 512K or later. $125. Microsoft Corp., One Microsoft Way, Redmond, WA 98052. (800) 426-9400 or (206) 454-2030. (May '88)

MindWrite ⧫⧫⧫⧫
MindWrite integrates outlining and word processing better than any other program. Sophisticated search and select options. Unimpressive speed. Version 2.1. $195. DeltaPoint, 200 Heritage Harbor, Suite G, Monterey, CA 93940. (408) 375-4700. (Feb '88)

Nisus ⧫⧫⧫⧫½
Nisus is a fast, RAM-based, powerful word processor. Extensive search capability can operate on open or closed files. Includes a color drawing environment and powerful macro language. Supports multiple levels of Undo. Lacks style sheets; looks and feels more like a text editor. RAM-based operation limits functionality on 1-megabyte machines. Version 2.03. Mac Plus, System 5.0 or later, and two 800K drives or hard-disk drive and one 800K drive. $395. Paragon Concepts, 990 Highland Drive, Suite 312, Solana Beach, CA 92075. (619) 481-1477. (Feb '90)

Pro-Cite ⧫⧫⧫½
Pro-Cite is a complete database-management system for bibliographies. Almost unlimited flexibility in bibliography formatting. Full-featured search and sort capabilities. Version 1.3.4 Requires Mac 512KE or later. $395. Personal Bibliographic Software, 525 Avis Drive, Suite 10, Ann Arbor, MI 48108. (313) 996-1580. (Feb '89)

QUED/M ⧫⧫⧫⧫½
QUED/M is an excellent text editor that saves documents in a form that's readable by most computers and printers. Doesn't support graphics or multiple fonts. Programming language allows database creation. Version 2.07. $119. Paragon Concepts, 990 Highland Drive, Suite 312, Solana Beach, CA 92075. (619) 481-1477. (Mar '88)

QuickLetter ⧫⧫⧫⧫½
QuickLetter is a well-designed and thoughtfully implemented DA for creating letters and envelopes. You can create stationery, complete with graphics, and maintain an address book that includes salutations. It's the best envelope creator/printer available. Version 1.02. Requires Mac 512K or later. $124.95. Working Software, P.O. Box 1844, Santa Cruz, CA 95061-1844. (408) 423-5696. (Apr '89)

RésumExpert ⧫⧫⧫⧫
RésumExpert is a set of résumé templates with a superb manual. If you need a good résumé, this is the way to prepare it. Versions for Word 1.05 (shudder) and Works are available at the same price. Requires Mac 512KE and Word 3.0 or later. $49. A Lasting Impression, 49 Thomberry Road, Winchester, MA 01890. (617) 721-2037. (Oct '89)

Vantage ⧫⧫⧫⧫
Vantage is a text-editor DA and the commercial version of McSink. It can change case; count the number of lines, words, sentences, or paragraphs in a selection; and search and replace on character strings (including invisibles). Supports macros and external commands written in Pascal. Includes a spelling checker. Version 1.0. Requires Mac 512KE or later. $99.95. Preferred Publishers, Inc., 5100 Poplar Ave., Suite 617, Memphis, TN 38137. (901) 683-3383. (July '89)

WordMaker ⧫⧫⧫½
WordMaker first appeared as an Amiga word processor called ProWrite. Low- to mid-level program with an interface similar to that of the original MacWrite. Supports up to ten open documents, imported color graphics, and mail-merge. Slow performance on 68000-based machines. Not a good choice compared with MacWrite II or WriteNow. Version 1.01. Requires Mac 512KE or later and System 4.1 or later. $124.95. New Horizons Software, 206 Wild Basin Road, Suite 109, Austin, TX 78746. (512) 328-6650. (Nov '89)

WordPerfect ⧫⧫⧫½
WordPerfect is a good choice for offices needing PC compatibility but is not so hot otherwise. Good internal file-management system and macro maker. Awkward interface. Version 5.1. Requires Mac 512KE or later and System 4.1 or later. $395. WordPerfect, 1555 N. Technology Way, Orem, UT 84057. (801) 225-5000. (Feb '89)

WriteNow ⧫⧫⧫⧫
WriteNow is the fastest, best pure-writing program available. Has an excellent spelling checker, mail-merge, graphics inclusion, footnotes, and header/footer control. Wonderful interface, as intuitive as the original MacWrite interface. Supports RTF. Version 2.2. Requires Mac with 128K or later. $195. T/Maker Co., 1390 Villa St., Mountain View, CA 94041. (415) 962-0195. (May '89)

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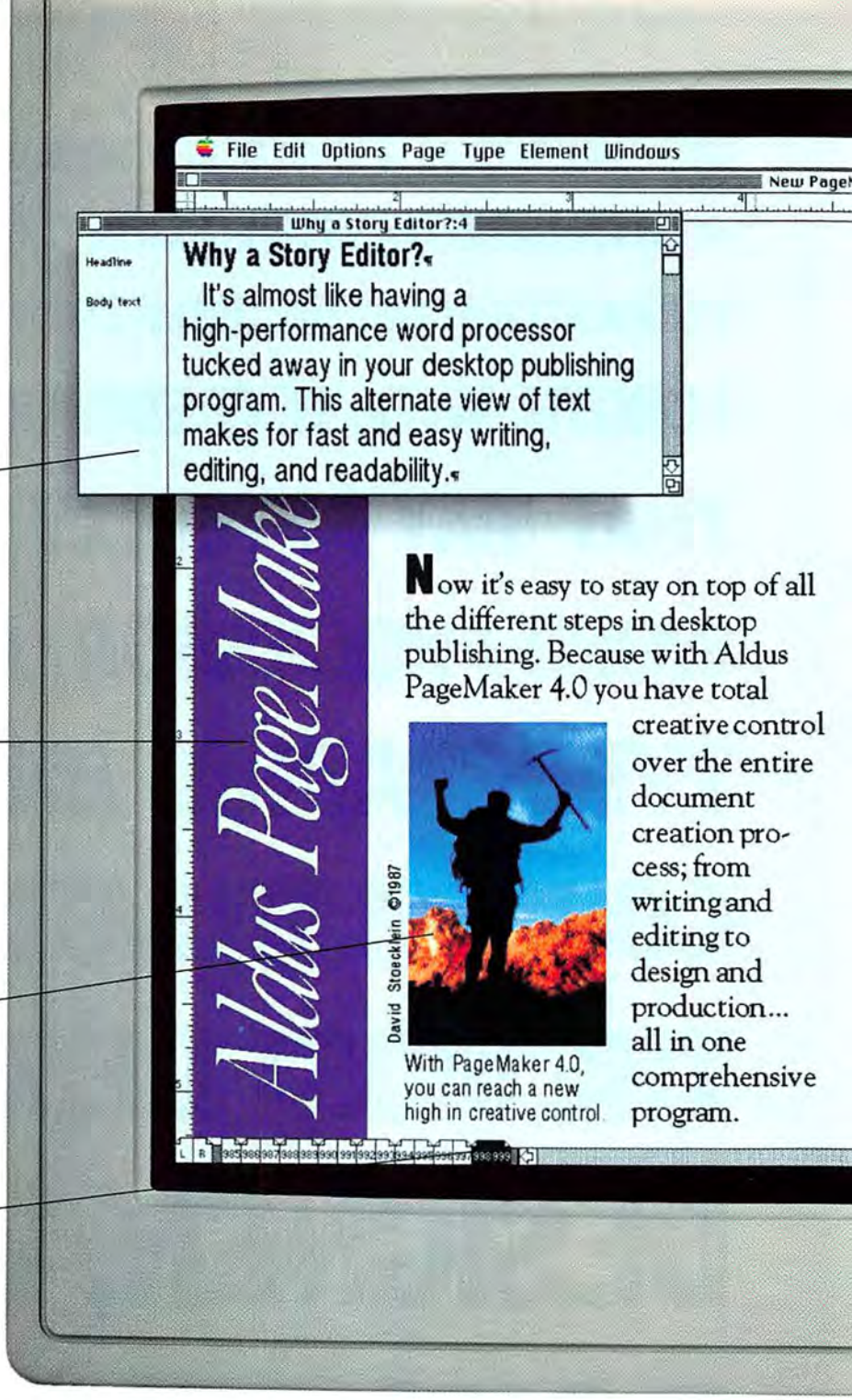
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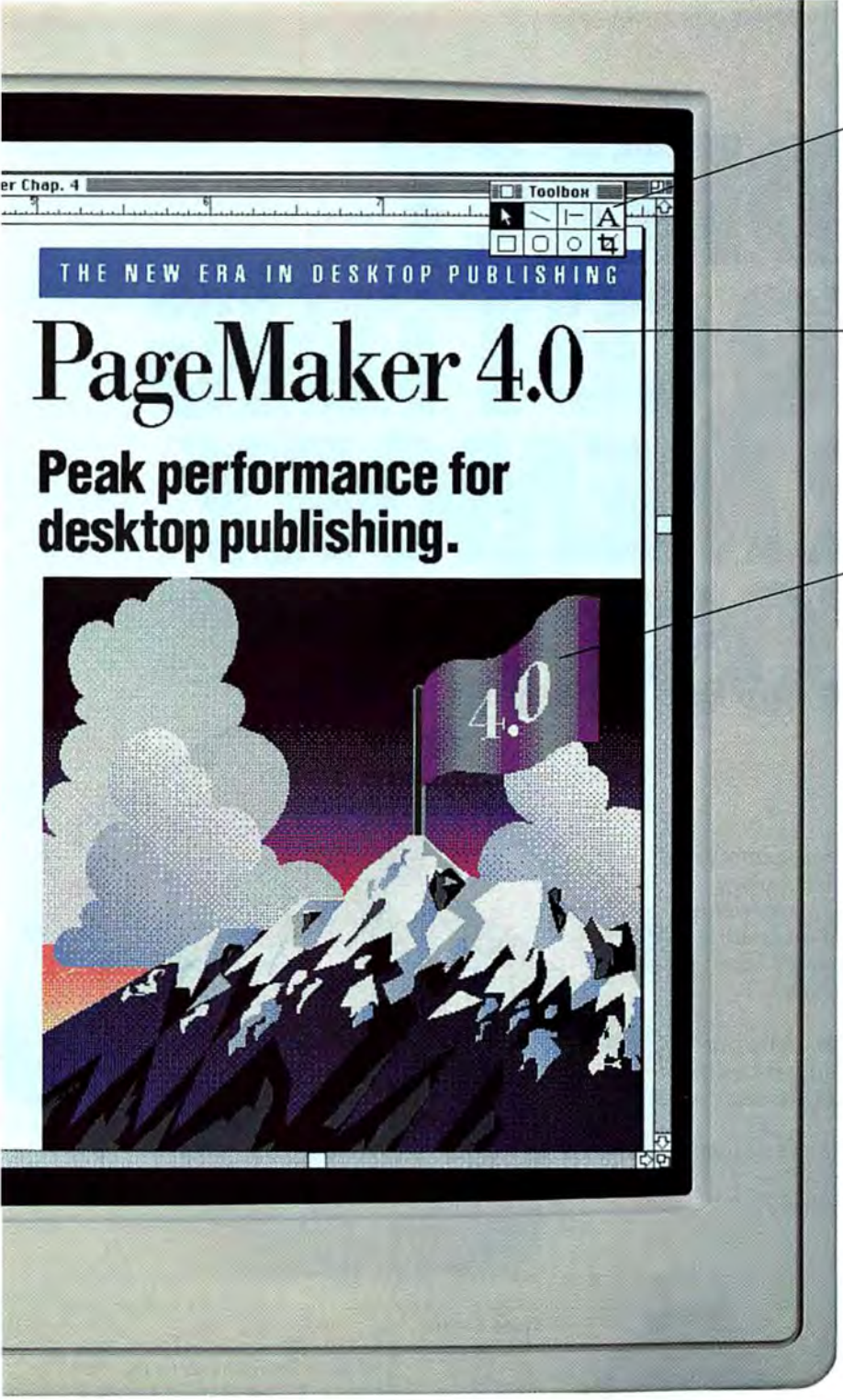
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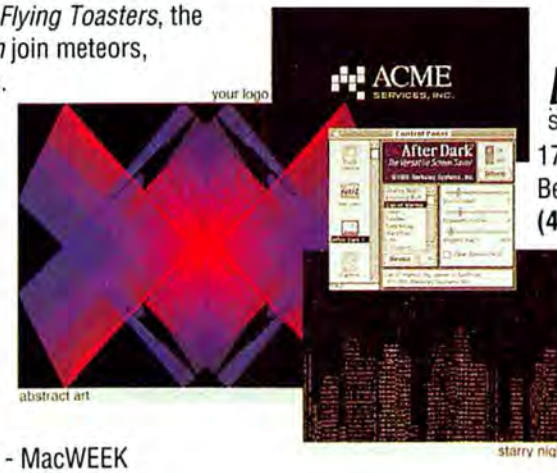
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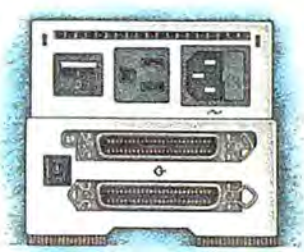
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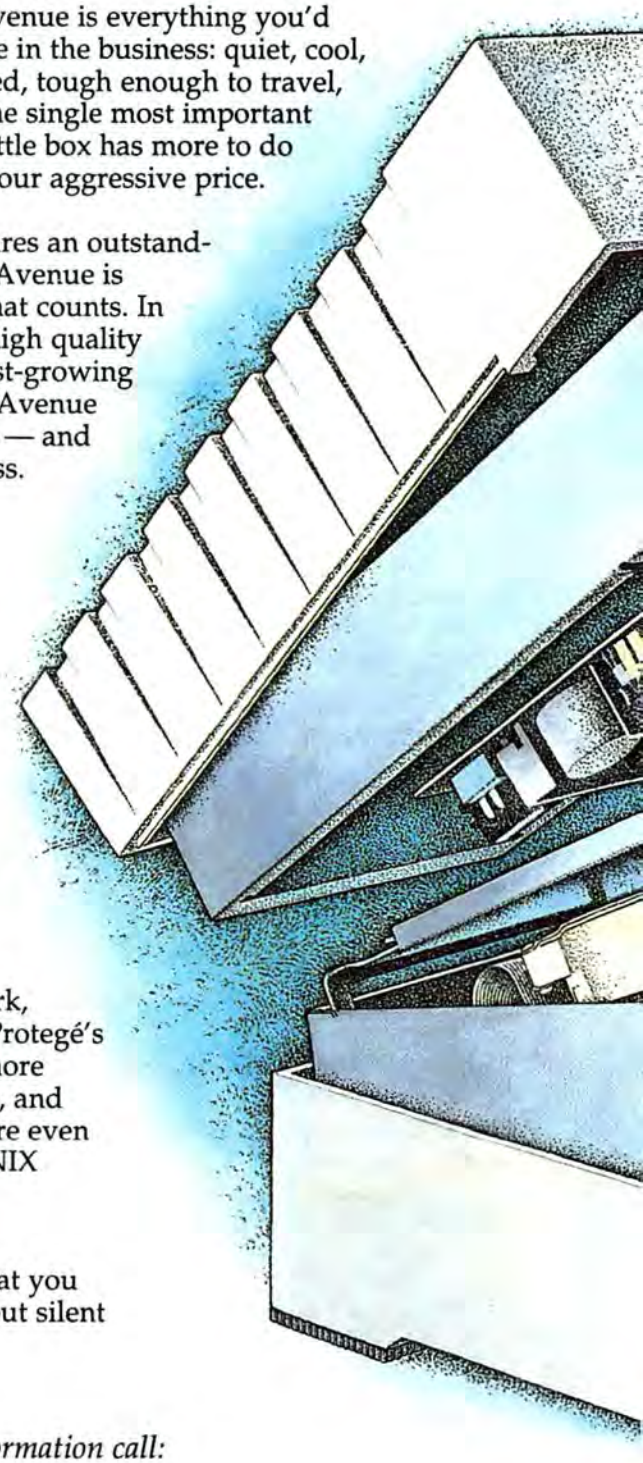
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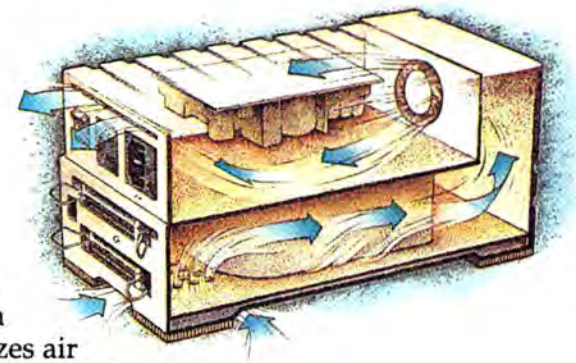
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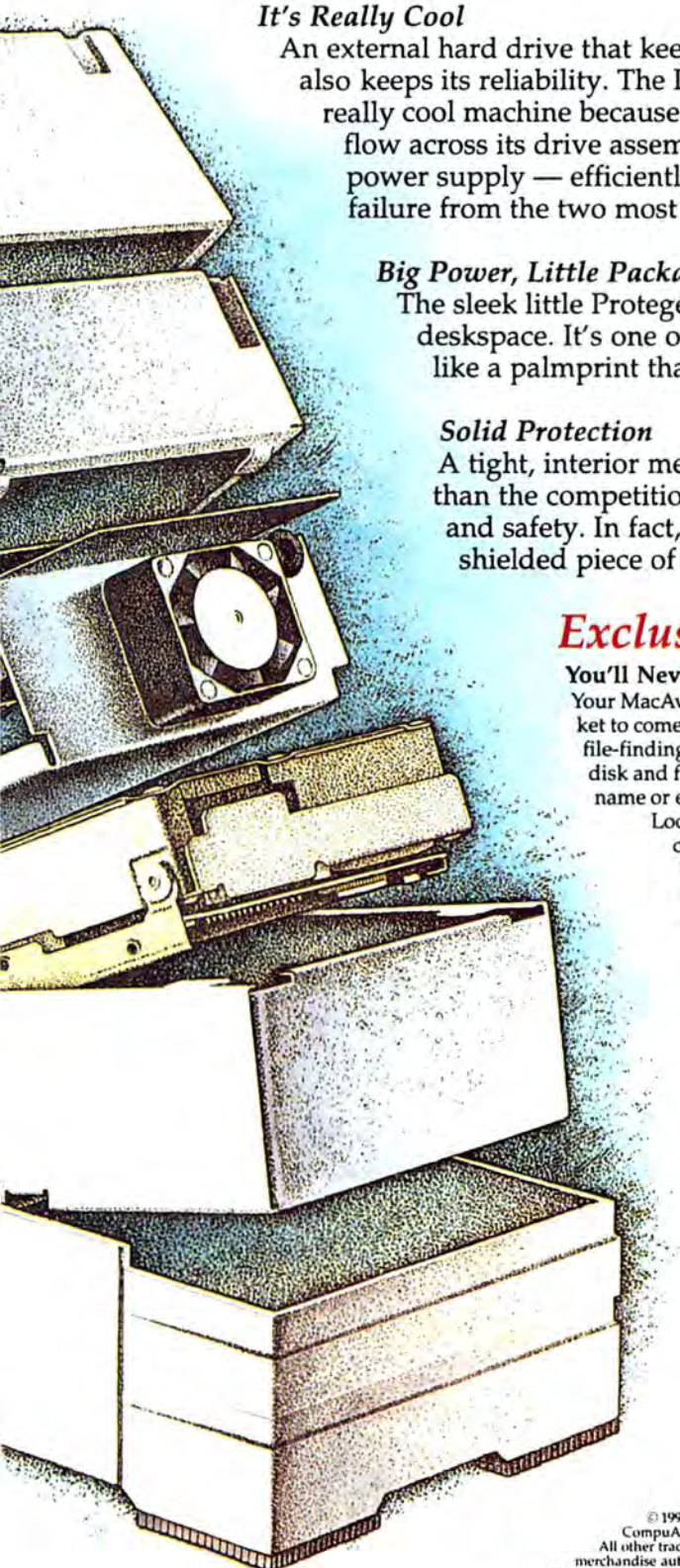
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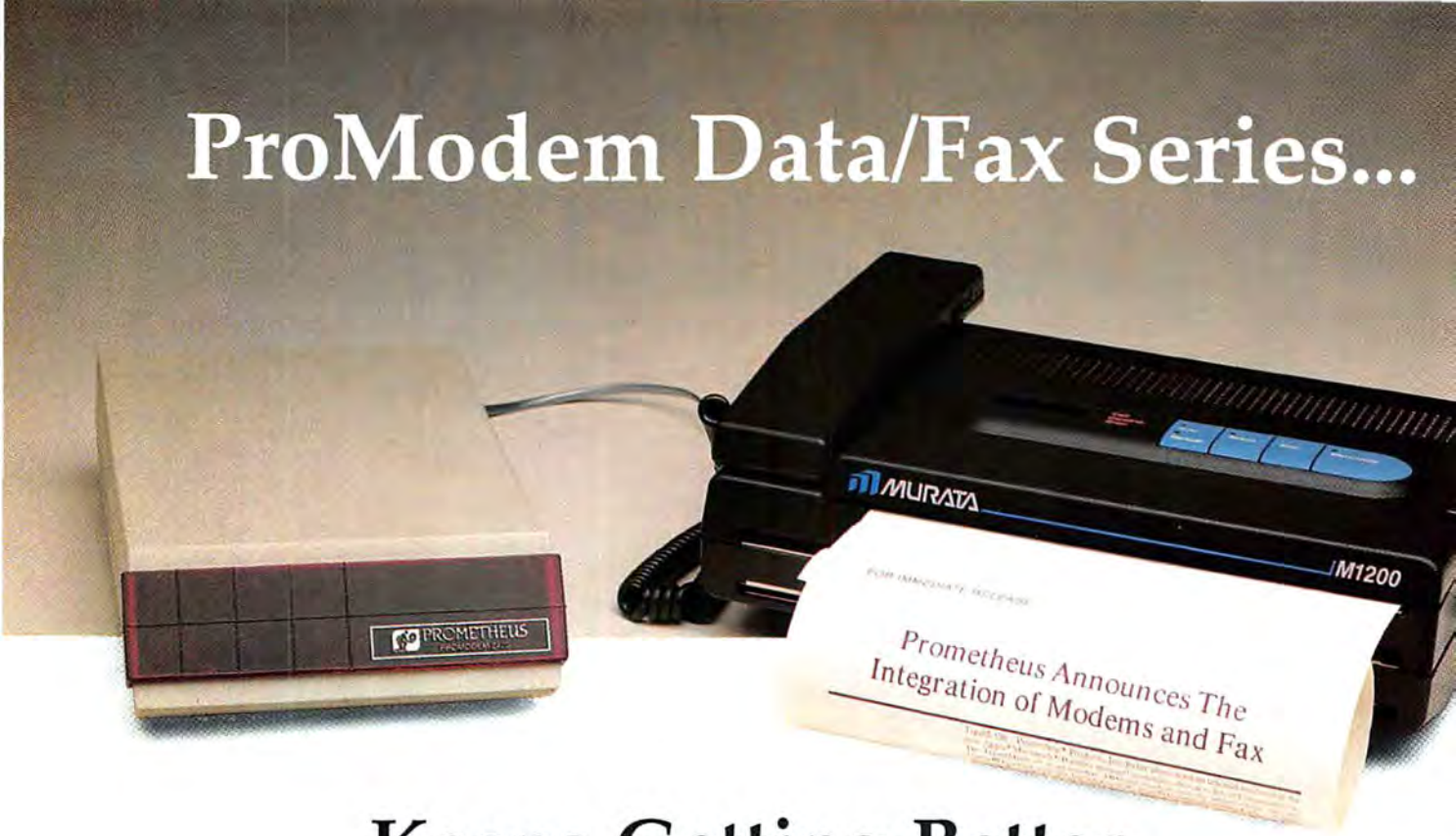
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The Elements of Auto-Tracing

Get a head start on great line art — all you need is an auto-tracing program, the right techniques, and a little patience.

When artists are faced with a job that requires drawing a real-world object or fleshing out a pencil sketch, they often give themselves a head start by tracing over the original image and then refining it. This approach saves time, effort, guesswork, and frustration. Traditional artists make their traces with translucent paper, but today's graphics programs, coupled with one of many affordable scanners, enable desktop-publishing artists to use a scanned image as a template for electronic tracing.

You can painstakingly hand-trace the contours of a scanned image with a mouse or stylus, but an auto-tracing program can go over the image automatically in a matter of seconds. Basically, auto-tracing produces an object-oriented image from a bit-mapped one. You identify the bit-mapped area you want to trace, and the program follows whatever edges it perceives, resulting in an object-oriented outline of the shapes it found. Auto-tracing is most useful for creating high-quality outlines from scanned line art, high-contrast photographs, and bit-mapped clip art (see Figure 1).

Object-oriented outlines have the

Figure 1: Pretrace Preparations

Figure 1: Auto-tracing produces an object-oriented image from a bit-mapped one and is most useful for creating high-quality outlines from scanned line art, high-contrast photographs, and bit-mapped clip art.

This 72-dpi painting was created by hand, scanned, and specially prepared for auto-tracing by cleanly separating white and dark areas. Patterned fills were replaced by solid black, while some fills were removed completely.



Figure 2: Tight Traces

Figure 2: Several programs let you control the accuracy of the trace and the smoothness of the finished tracing. UltraPaint displays an example of the effect, and it works interactively as you adjust the controls. In this case, a tight curve fit was chosen.



By Salvatore Parascandolo

advantage that you can resize and manipulate them without experiencing jagginess, pixel crumbling, or irretrievable loss of detail. A finished tracing can be edited with a program's native drawing tools, or it can be exported to other applications, where it can be reshaped, smoothed, filled, or combined with other graphics.

Auto-tracing can capture small contour details, or it can attempt to smooth out the irregularities inherent in a bit map. It can certainly give you a head start on a difficult rendering job. The quality and usability of your auto-tracings depend on the basic nature of the original image, the quality of the scanner, the resolution of the resulting bit map, the smarts of the auto-tracing program, and the options you've selected.

Matching the Tracer to the Job

Auto-tracing is now a common feature of graphics programs, from the simplest paint-only DAs to sophisticated PostScript powerhouses. Chances are you already have a program that provides it. Canvas, DeskPaint, Digital Darkroom, FreeHand, Illustrator, Streamline, SuperCard, SuperPaint, and UltraPaint all have this capability, and more programs with auto-tracing are emerging. Of these, only Adobe's Streamline is dedicated solely to auto-tracing; the other programs offer it as a feature.

Each program has its own tracing interface — some have customizable settings — but they all do a respectable job, even on intricate contours. The differences among auto-tracers become more evident as the traceable details get smaller or when low contrast or jumbled pixels make it difficult to determine where the edges are. Some auto-tracers let you set curve-fitting preferences — how tightly to hug the contours of the bit map, how small a speck to ignore, whether to run a trace only on the outermost contours of the bit map, and whether to bias line segments toward being curved or straight. Making a few tweaks to such preferences can work miracles (see Figures 2 and 3). Indeed, your trek to the terrific trace demands mastery over the options offered by your particular application.

You may find that a particular auto-tracer turns out outlines that are just plain

Figure 3: Loose Traces

Figure 3: This is what happens when you instruct an auto-tracing program to do a loose job of fitting the curve to the bit map's edges. Most details are lost or averaged out. Of course, you may want that effect, especially if the original image abounds with unnecessary details.

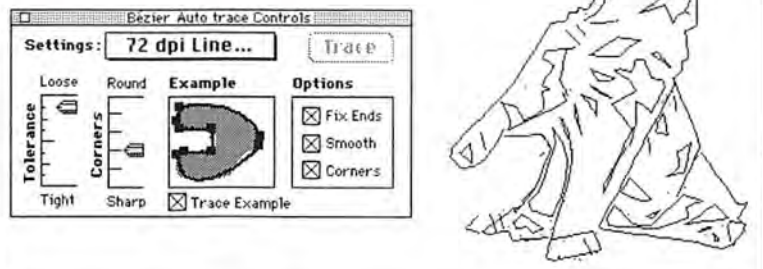
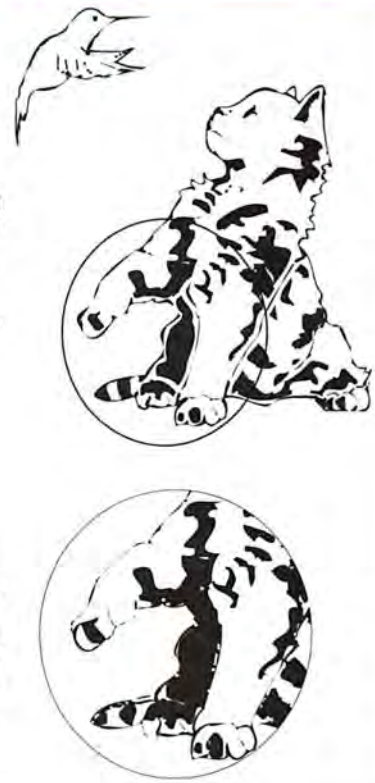


Figure 4: Ensuring A Clean Trace

Figure 4: A clean, traceable original produces a tracing with discrete areas, each of which is an independent object (top right image and bottom left-hand enlargement). Each traced area can be moved, colored, deleted, or given a different line thickness without disturbing unrelated parts.

If you don't manicure your original art before tracing, light and dark areas may intermix haphazardly, as they did in the bottom right-hand enlargement. Note how the black shaded area of the chest is bonded to the shading of the front and rear paws, making it difficult to edit or assign separate colors.



cheesy and that take you forever to clean up. Or you may conclude, in retrospect, that some tracings could have been done better or faster by hand. These are signs that your application or its auto-trace settings are inappropriate for the task or that the scan or original image is beyond help. But it never hurts to give auto-tracing a shot at any image. If you succeed, your time investment will pay off immediately, and the experience you gain in the attempt will improve future traces. Take the time to find your scanning and tracing tools' most effective settings — then record these settings where you can easily access them.

Keep in mind what your final use of the trace will be, and consult Table 1 to find the auto-tracing product(s) suitable for your needs. If the trace is headed for a QuickDraw program, your final tracing should be in PICT format. If you need PostScript line art, use a tracing method that produces PostScript outlines. You can also convert PICT outlines to PostScript with a conversion utility such as Adobe's DrawOver, or you can use FreeHand's Open command to convert PICT to native format.

Of the programs discussed here, only Streamline has the capability to go directly from a trace to printable line art. Unlike the other programs, it correctly identifies areas as being white or black, appropriately fills traced objects with black or white, and stacks finished objects so that no details are hidden. You can open a Streamline tracing in Illustrator and print it, often without a click of work — and with surprisingly good results (see Figure 4). Also noteworthy is Illustrator itself, which auto-traces one contour at a time as you click on areas of the bit map, giving you control over exactly what gets traced. Despite its piecemeal approach and minimal tracing controls, Illustrator does an excellent job of fitting the curve to the bit map.

Winning the Trace

Auto-tracing may sound easy, but it can be pure frustration if you don't follow a few simple guidelines. Here are a few pointers to improve your chances for achieving a usable trace:

• Have reasonable expectations — if your original image is scraggly, don't expect miracles. The idea is to produce a usable, not a perfect, trace. Even if all you get is a general outline of the major components, it can still be useful.

Figure 5: Auto-Tracing Photographs

Figure 5: Auto-tracing programs don't usually have the ability to trace gray-scale images. Before this scanned photo was traced with Digital Darkroom, it was *posterized*, which reduced the number of gray shades to eight. This process created discrete areas throughout the image that were easy for the auto-tracing program to handle.



Figure 6: Tracing Magic

Figure 6: The original photograph was scanned, posterized, despeckled, hand-groomed, and auto-traced in Digital Darkroom. It was saved as an Illustrator-format file and then opened in Illustrator for editing. Individual areas were manually assigned gray values, and some paths were tweaked. Much more could be done to the image, including colorization.



• Use an uncluttered image with good contrast, preferably in black-and-white. Anything with fuzzy edges is going to need work.

• Start with a large original image so the scanner can clearly discern details. Be sure the lines are continuous and are unbroken by scratches, stray marks, and printing flaws.

• Make a high-resolution scan (150 to 300 dpi). This is a must if your original image is small and detailed.

• Choose the high-contrast options on the scanner when scanning line art to force it to ignore insignificant specks. Adjust the brightness and contrast controls of the scanner to get the most detail and least noise.

• Examine the scan under magnification so you can retouch problems such as random specks, dust, and stray marks, and fix broken borders or create new ones.

• The clearer the borders, the better the trace. Slightly separate items that have a common border to ensure that they are traced as separate objects (see Figure 4).

• Isolate the area you want to trace. Anything outside this area will just slow down the process and give you endless stuff that you'll have to erase later. You can isolate the desired area at the time you scan, when you edit the scanned image, or when you specify what area to trace.

• Remove all details that you don't want converted into objects. These include background items as well as inner details that could interfere with the correct tracing of more-important areas.

• If the scan is a gray-scale image, don't expect a good trace, especially if there are mixed areas of subtly different grays. Use any available brightness and contrast controls so that the detail you're after stands out. Most importantly, you should posterize your image, which divides it into easy-to-discern bands of gray that can be traced cleanly (see Figures 5 and 6).

• Adjust the program's trace settings, if they are customizable, to produce paths with a manageable number of control points, or vertices. When a program follows the edges of a bit map too closely, it creates a control point at just about every pixel step. Too many of these vertices can slow down image handling and create an editing nightmare.

Table 1: Auto-Tracing Features

	Saves as PICT	Saves as PostScript	Controls curve fit	Biases lines to curve or straight	Ignores stray pixels
Canvas 2.1	●	●*	○	○	○
DeskPaint 2.0	●	○	●	○	○
Digital Darkroom 1.1	●	●	●	●	○
FreeHand 2.02	○	●	●	●	○
Illustrator 1.9.3	○	●	●†	○	○
Streamline 1.0	○	●	●	●	●
SuperCard 1.5	●	○	○	○	○
SuperPaint 2.0	●	●	●	●	●
UltraPaint 1.0	●	●*	●	●	○

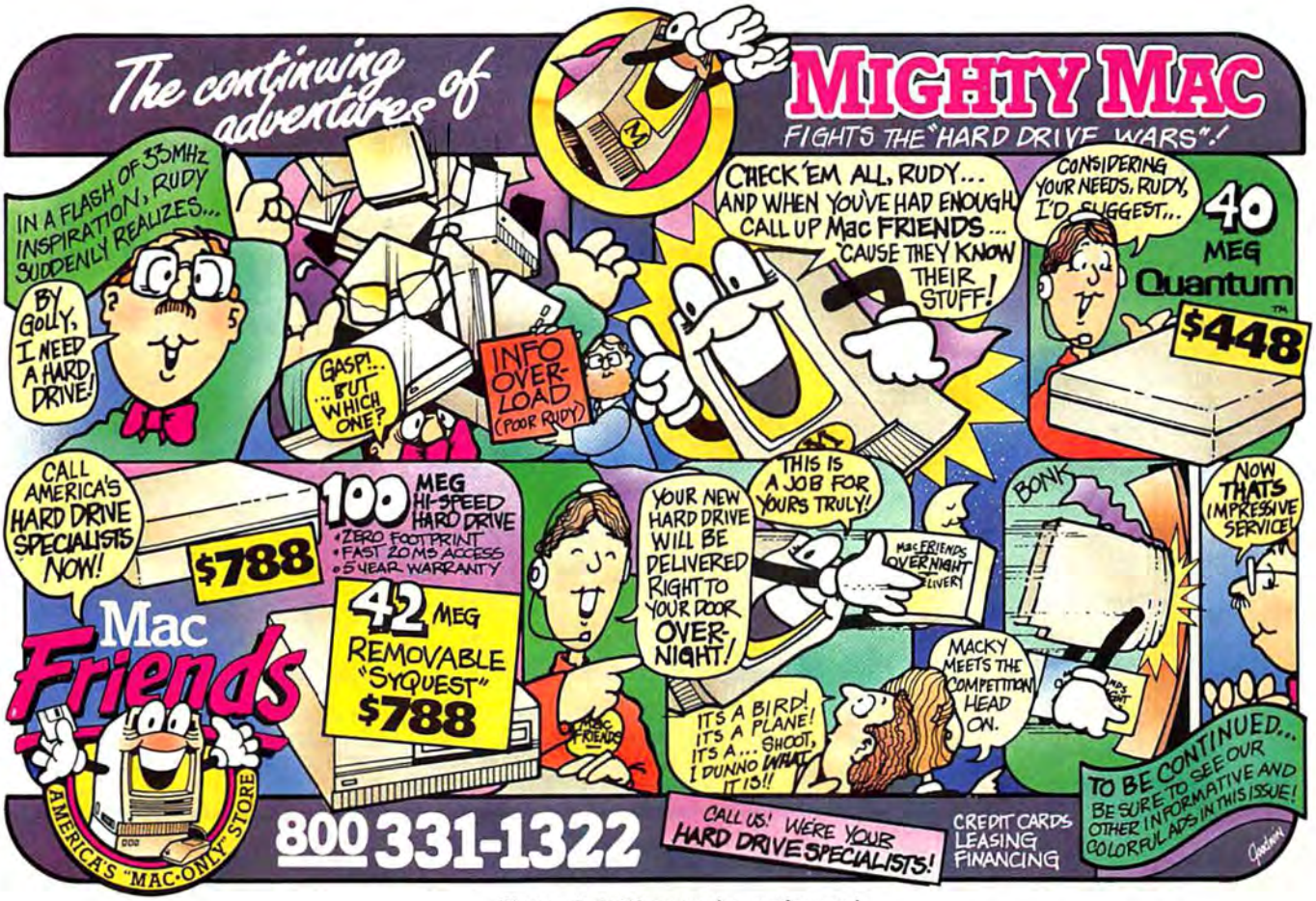
*Can convert entire files to Illustrator 1.1 format with Canvas Separator.
†Controlled by freehand tolerance value in Preferences dialog box.

● yes ○ no

• If your program makes tracings with too many vertices and has no options for you to control the number, you can delete the excess points from the finished tracing with an object-oriented graphics program. If you don't zap the extra points, the printed tracing will look jagged or lumpy.

Final Traces

Look through your software collection and find all the programs that auto-trace. Practice your auto-tracing technique with each one, using a typical scan or a bit-mapped drawing created in a painting program, and see just how far you can push the software — or how far the software can push you.



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Capturing Font Outlines

Ever wish you could manipulate text the way you do graphics? Here are nine ways to create editable outlines of your favorite fonts.

By Gregory Wasson

Modern typographical design involves more than simply selecting the right font for the situation. As geometric shapes, letterforms have become an integral part of the graphic artist's toolbox, lending themselves to distortion, collage, and various other kinds of manipulation. To use letters in this way in computer graphics programs, you must be able to convert text characters into editable graphic outlines and then manipulate them with an object-oriented program such as FreeHand, Illustrator, or MacDraw (see Figure 1).

The simplest, least expensive solution is to use a drawing program to enter the letters in the largest available point size and then to hand-trace the text (preferably with a polygon tool) at high magnification. This method could give you the quality you're after, *if* you're willing to spend time adjusting lines and tweaking tiny details. If you have the right tools, however, you can capture letters — or even entire alphabets — with a minimum of time and frustration.

The Toolbox

There are endless combinations of programs, hardware, utilities, and techniques that let you obtain editable font outlines. This article highlights nine possible scenarios, each of which uses a particular kind of software and/or hardware. Most capture only one letter at a time, but a couple let you snare the whole character set in one fell swoop (see Figure 2). One of these combinations may match the equipment you already have on hand; if not, determine which method is most cost-effective for you and invest in a font-filled future.

Before we get to the specific scenarios, here's a short list of elements that many of the methods have in common:

Fonts. The methods may work with Type 1 fonts, Type 3 fonts, or both. Type 1 fonts are Adobe-style encrypted fonts. Adobe used to be the sole purveyor, but many third-party vendors — Bitstream, Compugraphic, and Monotype, among others — now provide part or all of their typeface libraries in Type 1 format. Type 3 fonts are unencrypted, and third-party vendors produce them using Fontographer or other type-creation tools.

Auto-tracing. Several scenarios use the auto-tracing capabilities now found in many graphics programs (see "The Elements of Auto-Tracing" in this issue). Some of the programs that have an auto-tracing feature include Canvas, DeskPaint, Digital Darkroom, FreeHand, Illustrator, Streamline, SuperCard, SuperPaint, and UltraPaint.

Scanning. Scanners come in several flavors and are available from many companies. You can use anything from a hand-held monochrome scanner to a flatbed color scanner.

Screen capture. Several utilities let you convert all or part of your screen image into a PICT or PICT2 file for later editing. These utilities include Capture (Mainstay), Exposure (Preferred Publishers), and QuickShot (Boston Companies).

Printing. Where specified, you need a true Adobe PostScript printer such as a LaserWriter IINT. If you use ATM for font scaling, you can use a non-PostScript printer such as the HP DeskJet or LaserJet, the GCC Personal LaserPrinter, or even an ImageWriter. The printer can be used in three ways:

- As a source for creating printed letters from built-in fonts. After printing, these can be scanned and then traced. Adobe PostScript printers can print Type 1 and Type 3 fonts in practically any size. Some PostScript clones can do this only with Type 3 fonts; other printers come with their own outline-font system and can print a limited set at large sizes.
- As a source of font-outline information, so that editable outlines can be produced directly and accurately from data stored in the printer.
- As a resource for computing (but not printing) a large font bit map that can be displayed on-screen and saved as a traceable image.

Figure 1: Fontastic Art



Figure 1: You can't produce type effects such as this with a standard PostScript font. If you convert the font's characters to editable outlines, however, you can create imaginative display type in a drawing application such as Illustrator or FreeHand or in a font-manipulation program such as TypeStyler.

Figure 2: Instant Outlines

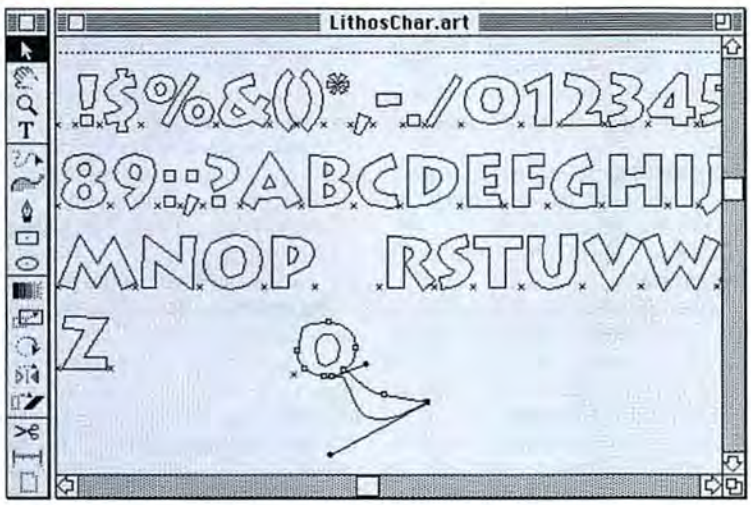


Figure 2: Font-conversion programs such as Metamorphosis can capture outlines of all the characters in one fell swoop, saving them in a neatly arranged Illustrator file. Each character has a full complement of control points, and you can perform endless manipulations, from tweaking the Bezier curves to adding graduated fills.

Scenario 1: ATM, screen-capture utility, Illustrator or FreeHand

1. Enter the character(s) you want to convert, using the largest point size that fits on-screen. Version 1.9.3 of Illustrator lets you specify 1,000 points or larger. FreeHand 2.02 limits smoothly created text to 127 points and, unfortunately, scales the bit-mapped font characters from there. In other programs, the maximum font size might be around 500 points.

2. Capture the character with any screen-capture utility, and save the dump as a PICT file.

3. In Illustrator, use the screen-dump file as a template when you open a new file. In FreeHand, use the Place command to import the file into a document.

4. Use either program's auto-tracing tool to trace the character from the imported bit map.

Pros: Simple procedure; excellent outline-editing capabilities.

Cons: Restricts you to outlines of Type 1 fonts (Type 3 fonts don't work with ATM).

Scenario 2: ATM plus Canvas, UltraPaint, or SuperPaint

1. Choose a Type 1 font, and enter the characters you want at the maximum point size the menu provides.

2. Select the text block, and scale it to any size you want (using the menu or by dragging). ATM will re-image smooth text when the block is resized.

3. Convert the text to a bit map: In Canvas or UltraPaint, convert the text block into a bit map; in SuperPaint, select the text block and choose Cut to Painting.

4. Auto-trace the text block, using the built-in function in each program. Tweak UltraPaint's and SuperPaint's trace controls to get the best results.

Pros: Good curve editing in all three programs. SuperPaint can produce PostScript outlines; Canvas 2.1 and UltraPaint can convert their QuickDraw outlines to PostScript through the Canvas Separator utility.

Cons: Works only with Type 1 fonts. Canvas' auto-tracing usually creates too many control points (see Figure 3). Canvas and UltraPaint need a separate utility to produce PostScript curves.

Scenario 3: TypeStyler plus Type 1 or Type 3 fonts

1. Use TypeStyler's Font Converter command to select and convert a Type 1 or Type 3 font to the SmoothFont format. (Note: The program crashes with some Adobe Originals fonts, such as Lithos and Juniper. It also can't convert composite Type 3 fonts — that is, fonts created in Fontographer that are based on Type 1 fonts.)

2. Click the text tool on the drawing area to bring up the Text Attributes dialog box. Choose the converted font's name and enter the desired letter(s).

3. At this point, you can work with the outline within TypeStyler or use the Export command to save the text outline as an Illustrator file.

Pros: Converting fonts directly to outlines is simple and bypasses digitizing and tracing errors. TypeStyler is relatively inexpensive ($199.95) and can perform extensive font manipulation in addition to creating font outlines.

Cons: None worth mentioning.

Scenario 4: FontLiner, Type 3 fonts

1. In FontLiner, open a Type 3 outline-font file.

2. Choose to make either filled or outlined characters.

3. Choose whether you want to convert the standard 94 ASCII characters or the entire character set (256 characters).

4. Select the Convert command. FontLiner saves the outlines as an Illustrator 1.1 file.

Pros: Fast conversion. Makes editable outlines directly from font-outline information, which bypasses digitizing and tracing errors. FontLiner converts some or all characters of a font in one pass. Inexpensive ($129.95).

Cons: FontLiner works only with Type 3 fonts that were created in Fontographer, and converting fonts to outlines is its only function. Occasional conversion errors.

Scenario 5: Metamorphosis, Adobe PostScript printer

1. In Metamorphosis, open the font file you want to convert.

2. Select EPS Format under the Options menu. If you want to convert all 256 characters of the character set (including European accents), click on that option.

3. Choose the Generate command. Metamorphosis uses the PostScript printer to create the outlines, which are saved in an Illustrator 1.1 file.

Pros: Can convert an entire Type 1 or

Figure 3: Trace Impurities

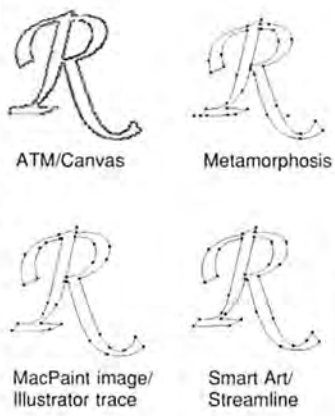


Figure 3: You'll have an easier time editing the font outlines if the conversion process generates few control points. Some programs — such as the QuickDraw-based Canvas (upper left) — produce too many control points, creating an editing nightmare. Programs such as Metamorphosis (upper right) that take font data and convert it directly to editable outlines produce the best results, since the process bypasses bit maps and tracing. PostScript drawing programs, such as Illustrator and Smart Art, can also provide satisfactory outlines.

Type 3 font set into editable outlines at the same time. Converting a font set directly to outlines is a straightforward process and bypasses digitizing and tracing errors.

Cons: Requires an Adobe PostScript printer. Metamorphosis is somewhat pricey ($295) and has only one function. Evolution, due out soon from Image Club, will accomplish the same thing for about $200 less — and it doesn't require a printer.

Scenario 6: Smart Art, Adobe PostScript printer, auto-tracing program

1. Open the Smart Art DA.
2. Choose a simple effect such as the Sample Effect.
3. Enter the character(s) you want to convert into a graphic outline. Make sure the angle is 0 degrees and the fill is 100 percent. Set the point size anywhere between 500 and 1,000 points.
4. Press the Reimage button. Smart Art will send the PostScript data to the printer and instruct the printer to return a bit map to the Mac.
5. Select the Export command, and select TIFF 600 dpi from the pop-up Format menu. Name and save the file.
6. Produce an outline with the auto-tracer of your choice.

Pros: Fast. Creates excellent traceable forms of a character in any Type 1 or Type 3 font.

Cons: Requires an Adobe PostScript printer.

Scenario 7: Scanner, auto-tracing program

1. Obtain crisp, well-printed text (the bigger the better), or use any suitable program and printer to output large, smooth characters (127 to 500 points).
2. Scan the output as line art. Save the scanned text as a 300-dpi TIFF image or as a 72-dpi paint or PICT file.
3. Trace the image in the auto-tracing program of your choice.

Pros: Straightforward method. Creates good outlines. Can use any printed material, not just available fonts.

Cons: Requires more steps than direct-conversion techniques such as TypeStyler or Metamorphosis.

Scenario 8: Digitizing tablet, drawing program

1. Obtain crisp, well-printed text (the bigger the better), or use any suitable program and printer to output large, smooth characters (127 to 500 points). When you use a digitizing tablet, the largest characters work best.
2. Open a drawing program, and trace the image with the stylus of your digitizing tablet. Use a freehand, curve, or polygon tool or a combination of these.

Pros: Works with any printed material, not just available fonts.

Cons: Quality depends on hand steadiness and tablet capabilities. Needs large characters for best results.

Scenario 9: QuarkXPress, Type 3 fonts, screen-capture utility, auto-tracing program

1. In QuarkXPress, open a new document.
2. Use the Render Limit command to set the limit to 25 points. This tells QuarkXPress that for all Type 3 fonts, it should create font sizes greater than 24 points mathematically (this approach produces smooth scaling with no jagged edges).
3. Select a Type 3 font in the largest point size that will fit on-screen. Enter your character(s). If you are running ATM, you can also use a Type 1 font.
4. Capture the character(s) with any screen-capture utility, and save the dump as a PICT file.
5. Trace the dump with an auto-tracing program.

Pros: Can capture outlines of Type 3 fonts, alone or in combination with Type 1 fonts.

Cons: Requires several programs. If you don't already own QuarkXPress, this method is probably not for you.

Figure 4: Outline Accuracy

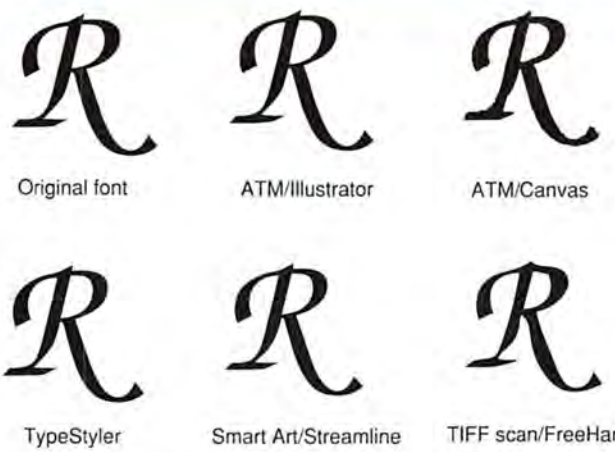


Figure 4: Some conversion methods are better than others at creating outlines that are faithful renditions of the original letterforms. Compare the text character at the upper left with the shapes produced by the various outline generators.

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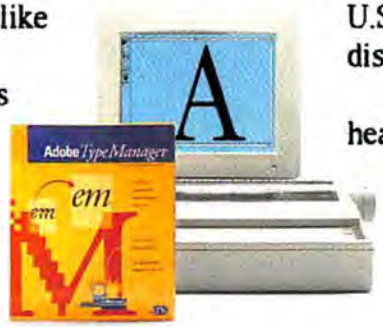
It clears up the jagged text on your Macintosh® screen. And, more importantly, out of your Apple ImageWriter® or Hewlett-Packard DeskWriter.™

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Creating Dynamic Maps

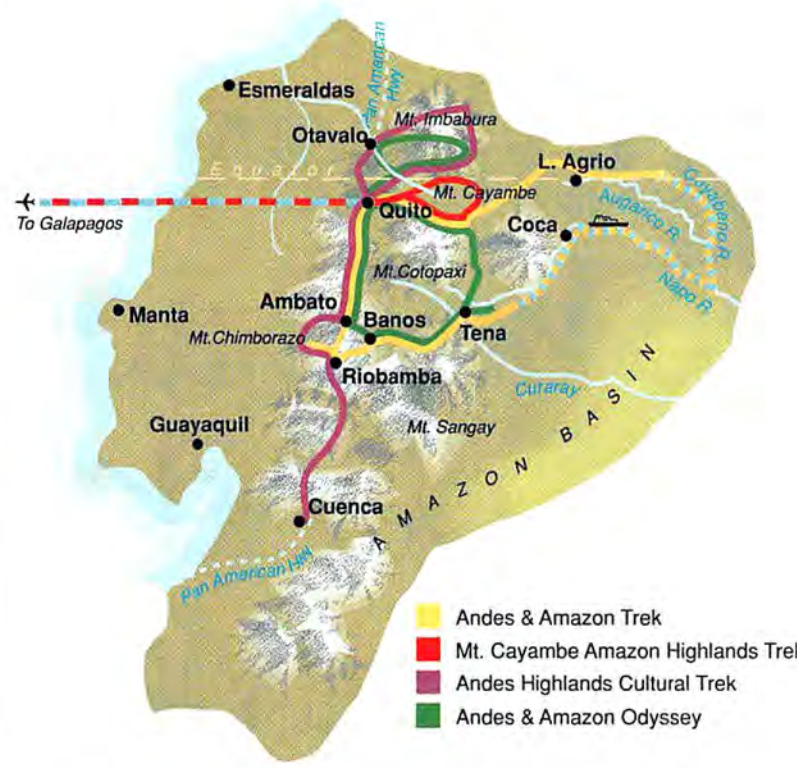
A step-by-step guide to making PostScript illustrations with bit-mapped textures and layers of color.

A colorful, detailed map of Ecuador was one of a series of tour maps produced with a PostScript illustration program for a travel-company catalog. The client wanted textured mountain ranges as well as a sense of visual excitement and adventure. Designer Jill Malena and art director John Odam created a FreeHand illustration (see Figure 1) that features layered elements of muted background color, bit-mapped texture, subtle color blends, and hot color highlights.

A palette of "safari" colors — khakis, deep greens, and muted browns — was chosen for the whole map series. The colors were specified in FreeHand as four-color process colors, but black was not used because it can cause moiré patterns

● **By the editors of *Verbum* magazine**

1 The Finished Map



The completed artwork features clean lines, precise coloring, and a bit-mapped texture.

2 Creating the Map Outline



An outline of Ecuador was drawn in FreeHand, using a scanned map as a template. The base country outline was filled with khaki green; given no stroke (line weight); and sent to layer 80, below the active drawing layer.

3 Drawing a Texture



Tracing paper was placed over a hard-copy map, and a cross-hatched pencil drawing was made of the ridges and slopes of the mountains. The drawing was scanned as a 75-dpi gray-scale bit map. Adding a dither in the scanning program gave the drawing a stippled effect.

4 Placing a Bit-Mapped Image



The scanned drawing was saved as a MacPaint file, placed in the FreeHand document, and positioned over the map outline. It was made transparent (through the Element Info dialog box), colored blue, and sent to layer 90.

5 Blending to Show Mountain Elevation



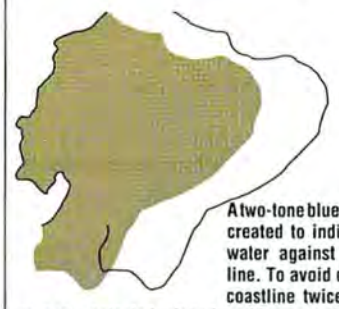
To further emphasize the mountains' topography, a dark shape was drawn around the base of each mountain range and blended in three steps to a lighter shape drawn along the ridge.

6 Layering Map Elements



The blended mountain shape was sent to layer 85, above the country base and beneath the bit-mapped texture. Multiple drawing layers are very useful, making it easy to interleave the map outline and mountain elements. FreeHand's layers run from 0 at the bottom to 200 at the top.

7 Cloning and Cutting a Line



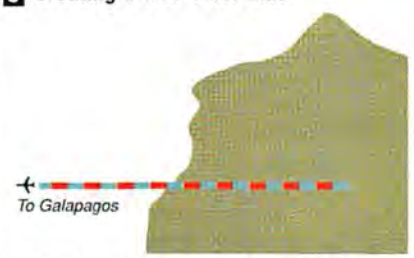
A two-tone blue outline was created to indicate ocean water against the coastline. To avoid drawing the coastline twice, the base map was selected, cloned, and temporarily given a 1-point black line (no fill). The clone outline was cut, with the knife tool, at the beginning and end of the coastline and then deselected. The unwanted portion was selected and deleted.

8 Styling the Coastline



The remaining line was specified as a 12-point line in light blue and then cloned and styled as a 24-point line in a slightly darker blue. The darker line was sent behind the lighter one and both were sent behind the country outline, which obscured half their line width.

9 Creating a Two-Color Line



Two-point lines in bright, hot colors made the tour routes easily visible against the muted map backgrounds. To show ancillary air and water routes, lines were combined with dingbat symbols of a plane and a boat. To create a two-color line for some routes, the route lines were cloned. The clones, which were automatically placed on top of the originals, were changed to dashed lines in contrasting colors.

when printed. Colors were given names corresponding to their use — *base, ridge, rivers,* and so forth — which made it easy to find the desired color in the color menu and to change colors. (Hint: To change a color spec throughout a FreeHand illustration, select an element that contains the color, choose Edit Color from the Color menu, and type the changes in the corresponding dialog box. Once edited, all elements with that color will change to reflect the new specs.)

PostScript illustration programs have flexible color specifications and multiple drawing layers that make it easy to organize and color numerous elements. The addition of a bit-mapped graphic (see Figure 4) provides a soft texture within the clean lines and flat-color precision of the PostScript illustration, as the finished Ecuador map shows (see Figure 1).

Although the artists used Aldus FreeHand for this project, similar results can be achieved with Illustrator 88, Canvas 2.1, MacDraw II, or SuperPaint 2.0.

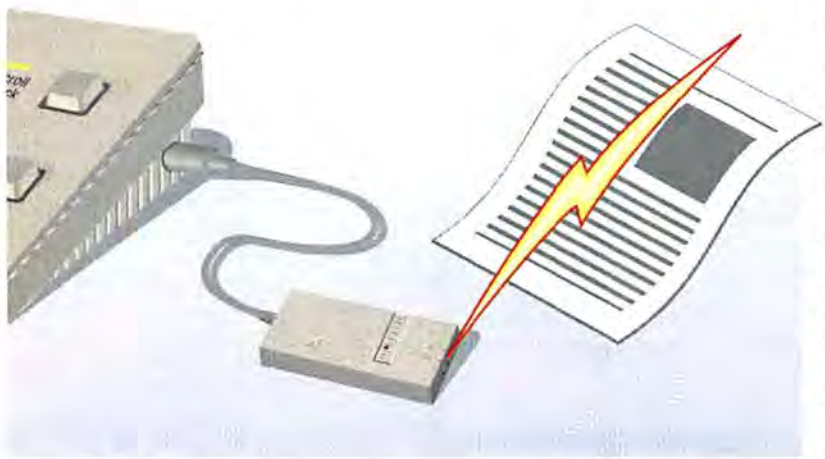
You can contact *Verbum: The Journal of Personal Computer Aesthetics* at Box 15439, San Diego, CA 92115; (619) 233-9977.

Toolbox



This map was produced in FreeHand on a Mac IIcx with 4 megabytes of RAM and an 80-megabyte internal hard-disk drive. Scans were made with an Apple Scanner, and initial proofs were printed on a LaserWriter IINTX. Color proofs were printed on a QMS ColorScript 100, and the color-separated film was output on a Linotronic L-300 at 2,540 dpi with a 133-line screen.

Currents



Wired for Fax

Several months ago, Solutions announced the FAXGATE gateway software for Microsoft Mail and CE Software's QuickMail. FAXGATE lets users of these mail systems utilize their mail server as a fax server as well. But users who didn't have, need, or want a full E-mail system still lacked a suitable alternative for sharing a fax modem over a network — now they have one. Solutions has announced FAXSHARE, which is due to ship in the third quarter of 1990. FAXSHARE will provide the functionality of FAXGATE — any Mac on an AppleTalk network will be able to send a fax over the network by sending it to a server. FAXSHARE will still require you to assign a Mac as a centralized server, but it won't require you to run an E-mail system on the server. The FAXSHARE server Mac must be running Solutions' BackFAX software and have a BackFAX-compatible modem connected to it. Each user must have a copy of FAXSHARE's client software, MailMaker, which is necessary to send the data over the network. FAXSHARE will cost $495 and will include a five-pack of MailMaker. Additional five-packs of MailMaker cost $195.

But just because multiple users can now use a single fax modem doesn't mean that the personal modem is any less interesting. Global Village Communication has announced its first product, the TelePort, for June release. The TelePort is a 2,400-bps Mac-only modem with Level 5 MNP error correction and compression. Another one, you ask? Ah, but this one plugs into the Mac's ADB (Apple Desktop Bus) port (the port where you attach your keyboard and mouse), which has several advantages. When the ADB is powered, the modem can get power from it. Consequently, the TelePort has only a single cable — molded into the device — and no need for an external power supply. When you take it on the road, you don't need to worry about leaving part of it behind.

The TelePort also keeps the Mac's serial port free. This may not seem immediately useful, but think about the times when you've wanted to connect more than one serial device to your modem port (say, an ImageWriter and a modem) but couldn't. There's currently no way to have more than two serial connections to your Mac simultaneously — one of them is usually taken up by a LocalTalk connection. But once Apple's Macintosh Communications Toolbox becomes more prevalent (it's available now as an add-on for System 6 and will be built in to System 7), you will be able to have multiple sessions running on your Mac. By the way, running the TelePort from the ADB will not render inoperative any other serial device that is already connected to your modem port.

The TelePort retails for $225. TelePort/Plus 2, which should be available by the time you read this article, will include software that will enable you to use the TelePort as a 4,800-bps send-only fax modem. It will also include address-book software that can serve as an automated personal phone directory when used in conjunction with the modem's dialing capabilities. TelePort owners can upgrade to TelePort/Plus 2 capability. The TelePort/Plus 2 retails for $325.

Solutions, Inc., 30 Commerce St., Williston, VT 05495; (802) 865-9220. Global Village Communication, 1204 O'Brien Drive, Menlo Park, CA 94025; (415) 329-0700.

EtherNews

Since our June lab report on Ethernet cards for the Mac (see "Are You Ready for Ethernet?" Buyer's Guide, June '90, page 20), Asanté has dropped the price of its Ethernet cards by a whopping $100: SE cards now cost $395, and SE/30 and NuBus cards are $495. This price drop makes it as inexpensive to put a Mac on Ethernet as to put a PC on. All of these cards are available either with 10BASE-T and thicknet or with thinnet and thicknet connections. (10BASE-T is a standard for unshielded twisted-pair cabling for Ethernet networks.) Asanté's SE/30 and NuBus cards are available with an optional 64K-RAM buffer for $545.

Adaptec is also shipping 10BASE-T products: a NuBus card called the EtherMac II and a 10BASE-T module for its Nodem SCSI-Ethernet adapter. The 10BASE-T Nodem lists for $595, $100 more than a Nodem equipped for thinnet or thicknet. The EtherMac II is available with 10BASE-T and thicknet connections for $595 or with thinnet and thicknet connections for $495.

Meanwhile, Farallon Computing has licensed Novell's (Kinetics) L-series Ethernet cards for NuBus and the SE/30 and has renamed them PhoneNET Cards for Ethernet. These cards support LattisNet unshielded-twisted-pair and thicknet connections but not 10BASE-T. Each

By Stephan Somogyi

card will ship with a copy of Farallon's Timbuktu screen-sharing software. Both cards retail for $649 each; a ten-pack of NuBus cards is available for $5,995.

Farallon will also be shipping its 10BASE-T-compliant StarController EN active-star hub by the time you read this. Wait — those who are still awake are saying — Farallon's cards are LattisNet and its hub is 10BASE-T? Yes! And to deal with this minor incompatibility, you will have to restrict your wire runs to 170 feet instead of the 300 feet allowed by the 10BASE-T standard. And Farallon's StarCommand software will allow you to turn off link integrity, a 10BASE-T feature that LattisNet doesn't support, on a port-by-port basis. The StarController EN will cost $2,495.

Asanté Technologies, Inc., 405 Tasman Drive, Sunnyvale, CA 94089; (408) 734-4844. Adaptec, Inc., 691 S. Milpitas Blvd., Milpitas, CA 95035; (408) 945-8600. Farallon Computing, Inc., 2000 Powell St., Suite 600, Emeryville, CA 94608; (415) 596-9100.

Token Representation

Apple introduced the first token-ring card for the Mac late last year, along with new TokenTalk software that enables Macs connected to a token-ring network to communicate with AppleShare servers, LaserWriter-type printers, and other AppleTalk devices. Apple's offering, the TokenTalk NB Card, costs $1,250, runs at 4 Mbps (megabits per second), and supports only Mac II-family (NuBus) machines.

Several other vendors now also sell token-ring products for Macs. h-three Systems was the first company besides Apple to offer Mac token-ring products, and it remains the only company that has cards for NuBus, SE/30, and SE machines. h-three's MacRing cards support 4-Mbps token-ring networks. The SE card retails for $795; the SE/30 and NuBus cards each cost $895.

Tri-Data has announced LanWay TR 16/4 token-ring adapters for NuBus Macs and SE/30s. These are the first token-ring cards for the Mac that can operate at 16 Mbps as well as at the more common 4 Mbps. Both cards list for $1,095 each and will be available in the second quarter of 1990.



Asanté has lowered the cost of putting Macs onto Ethernet to $495 a node.

Asanté Technologies offers a variety of 4-Mbps NuBus token-ring cards. Its MacConII/TR cards are full 32-bit cards that are available with LLC (logical link control) for $795 and without LLC for $695. LLC lets devices in a token-ring network determine the order in which they can talk. Having this option in firmware on the interface card improves network efficiency.

Asanté also makes MacCon+IITR cards, which have an additional Type 3 connector for unshielded twisted-pair wiring; the MacConII/TR supports only Type 1/Type 2 *shielded* twisted-pair wiring. The MacCon+IITR card costs $845 with LLC support and $745 without it.

Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014; (408) 996-1010. Asanté Technologies, Inc., 405 Tasman Drive, Sunnyvale, CA 94089; (408) 734-4844. h-three Systems, 100 Park Drive, Suite 204, Research Triangle Park, NC 27709; (919) 549-8334. Tri-Data Systems, Inc., 3270 Scott Blvd., Santa Clara, CA 95054; (408) 727-3270.

Gates and Routes

Dayna showed its EtherPrint for the first time at Macworld Expo in April. It's a network device that allows a printer on LocalTalk to be seen from Ethernet. The EtherPrint is not a router, although it performs a function that previously required a router: It lets Macs on an EtherTalk network print to LocalTalk printers. At press time, the EtherPrint was in beta and you could connect only a single printer to it, but Dayna was looking into expanding the number of printers the EtherPrint could support, prior to its release in June. The EtherPrint retails for $495.

Liaison, Infosphere's software router, now supports AppleTalk Phase 2. This means that Liaison can be used to route to TokenTalk and EtherTalk Phase 2 networks, as well as between EtherTalk Phase 1 and Phase 2 networks. The new version, 2.0.6, also supports the Liaison Gateway for Microsoft Mail. This separate gateway product uses Liaison's dial-up capabilities to provide wide-area connectivity between Microsoft Mail servers, a feature that Microsoft Mail lacks. The gateway costs $95 and is available directly from Infosphere.

Shiva recently acquired the rights to Novell's FastPath and began manufacturing, marketing, and supporting it on June 1. The name of the product changed from Kinetics FastPath 4 to Shiva FastPath 4, but its price, $2,795, remains the same. Shiva plans to market the FastPath, with its multiprotocol support, for use as a local-area-network router and protocol gateway and to promote its EtherGate router, with dial-up capabilities, for use in wide-area networking.

A newcomer on the Mac-connectivity scene, Network Resources, is now shipping its MultiGate 2000 router. The MultiGate has its own CPU and RAM, which means you can reconfigure and upgrade it by downloading software to it. It routes between LocalTalk and Ethernet. With optional IPGate software, it can serve as an AppleTalk-to-TCP/IP gateway as well. The MultiGate 2000 costs $2,395; IPGate software has a retail price of $395.

Dayna Communications, Inc., 50 S. Main St., Salt Lake City, UT 84144; (801) 531-0600. Infosphere, 4730 S.W. Macadam, Portland, OR 97201; (503) 226-3515. Network Resources Corp., 2450 Autumnvale Drive, San Jose, CA 95131; (408) 263-8100. Shiva Corp., 155 Second St., Cambridge, MA 02141; (617) 864-8500.



What to do with Timbuktu.

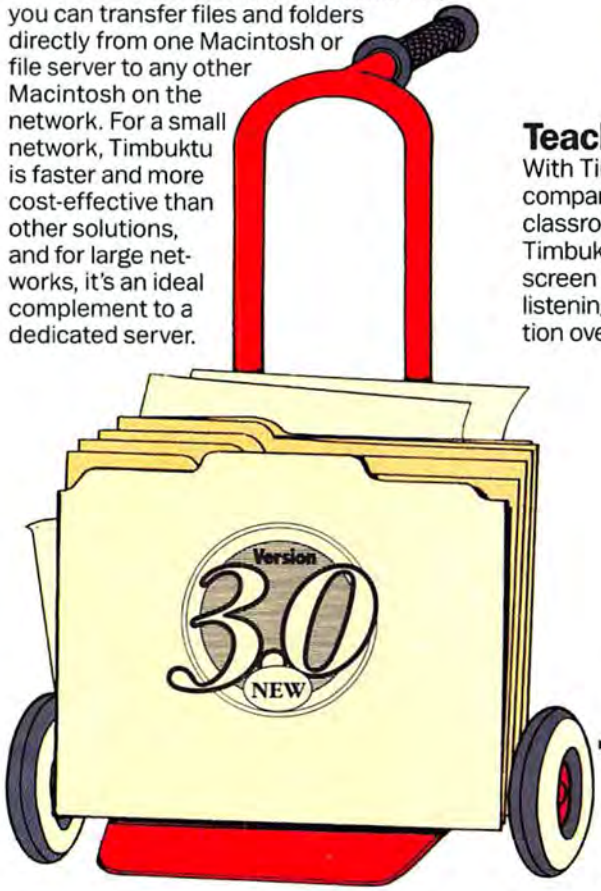


Share screens.
With Timbuktu on every Macintosh, you can invite others to share your point of view. (Advanced password protection ensures privacy.) Sharing screens allows two or more users to work on any document simultaneously. It also allows user support people to help solve users' problems without leaving their desks. Combine Timbuktu with Farallon's network management software, and support people can manage computers and servers from anywhere on the network. Timbuktu/Remote functions similarly to Timbuktu, only over modems or ISDN links.

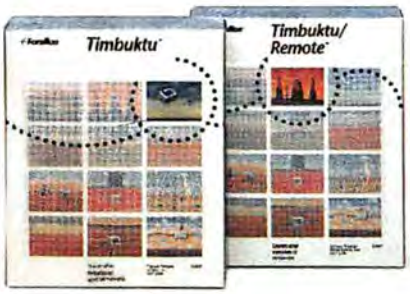
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BRIDGES

From Here to There and Back Again



ILLUSTRATION: GREG CLARKE

Need to transfer a file from your laptop to a Mac? LapLink Mac is a great solution.

By Stephan Somogyi

You've been traveling. You wanted to get some work done on your trip, so you took your Toshiba 1000SE (or, if you wanted to combine business with an aerobic workout, your Macintosh Portable) with you. Now you're back in the office. You need to get your files off the portable and onto your office Mac. There's SneakerNet, of course. But if you have a lot of data to move, or if it's on 5.25-inch disks, things can get tedious.

Enter LapLink Mac, release III, from Traveling Software. LapLink Mac comes in two flavors: a Connectivity Pac and a Network Pac. The Connectivity Pac ($189.95) is a complete hardware and software solution for moving files quickly and easily between two Macs or between a Mac and a PC. The hardware part is a cable. Don't laugh: This is the world's greatest cable! At each end, it has a DIN-8 Mac serial plug (the kind that attaches to the modem port of most Macs); the cable also has two serial connectors that are common on DOS machines, one DB-25 and one DB-9. The software consists of a single Mac disk, two 3.5-inch DOS disks, and three 5.25-inch DOS disks — everything you need to get set up.

The Connectivity Pac can also be used over AppleTalk networks, but it is limited to two users. If you plan to use LapLink mainly over AppleTalk, you may want to consider a Network Pac ($299.95), which is intended for multiple users on AppleTalk. The Network Pac doesn't include the cable, but it allows up to five users to be active on a network. Additional Network Pacs increase this number in increments of five.

LapLink has a simple, straightforward interface. The Mac application has a Connection menu with several different options for connecting to other computers (see Figure 1). Once the connection is made, you can initiate file transfers from either side. The Mac side displays a Font/DA Mover-style dialog box that contains two file lists: One lists your local Mac volumes, and the other lists volumes that are available on the remote machine (see Figure 2). Mac users can also use the LapLink INIT, which allows another LapLink user to access your machine in the background even if you aren't running the LapLink application. Using the INIT rather than the application degrades throughput by some 70 percent, though.

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CUTTING EDGE DISK DRIVES (Cutting Edge) These external hard drives plug right into your Mac's SCSI port and have a streamlined design to fit comfortably under your Mac. They are preformatted and ready to use immediately. See listings below for full range of Cutting Edge Disk Drives.

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Basic Needs
CPU Stand ... $16
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Dust Cover – Mac IIcx RGB & Extended Keyboard ... $12
Dust Cover – Mac Plus and Keyboard (grey nylon) ... $11
Dust Cover – Mac SE & Extended Keyboard ... $11
Keyboard Flip ... $6
Large Screen Monitor Stand ... $38
Laser Printer Stand ... $28
Curtis
Command Center ... $89
EID Center Co.
Teak Disk Holder – 50 ... $14
Teak Disk Holder – 100 ... $21
Teak Disk Holder – 150 ... $31
Teak Double Drawer Disk Holder– 140 ... $25
Ergotron
MacTilt SE – Platinum ... $68
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Macinware Mac IIcx Carrying Case ... $85
Macinware Plus Case ... $64
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Mac II Stand w/ Extension Cables ... $64
MasterPiece Mac II ... $105
Power Tree 50 Surge Protector ... $54
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Mac-to-Mac

If the computers involved in your LapLink file transfer are already on an AppleTalk network, the AppleTalk-to-Mac connection option is the easiest, but it is relatively slow at LocalTalk speeds (see Figure 3). Using the cable for a direct connection, along with the accelerator Traveling Software provides, is roughly twice as fast as transferring over LocalTalk. The accelerator attaches to the multiheaded cable's DB-25 connector.

But LapLink Mac doesn't stop here. As you may recall, we began with a tale of a hardworking employee on the road with a portable computer, possibly a Mac Portable. Pretend you're that user and that you're about to leave on a trip. You have megabytes of information on the Mac in your office that you need to transfer to the Portable before you leave so you can do a PowerPoint presentation when you arrive in Poughkeepsie. Don't you wish you could transfer files directly from the hard disk in your office Mac to the Portable's hard disk? With LapLink's SCSI Disk Link application, you can.

Using SCSI Disk Link, you can mount the Portable's internal hard disk as a SCSI hard-disk volume on a second Mac. This feature alone justifies LapLink's price for Mac Portable owners. During such transfers, the Portable is rendered comatose by the software, but you can copy files to and from its hard disk by using the Finder, as quickly and easily as if it were just another hard-disk drive connected to your Mac's SCSI chain. In fact, that's precisely what it is.

There are some drawbacks to this approach. First, before connecting the SCSI cable to the Portable, you must turn off all the other SCSI devices in the chain, including the other Mac. Then, obviously, after you connect the cable, you have to turn everything back on and wait for your Mac to go through its startup process. (If your Mac has even half as many INITs as mine, that's good for a trip to the coffee machine.) Second, if you have other SCSI devices (scanners or external hard-disk drives, for example), you have to deal with the bane of SCSI existence: termination. The Portable must be the last device in the chain, and no other device can be terminated. Third, if you have no other SCSI devices attached, you need a 25-pin-to-25-pin SCSI cable. Traveling Software sells this type of cable for $14.95. But there's nothing special about it: You can just as easily (and



Figure 1: The LapLink Connection menu lets you select from among a variety of connection types for copying files to and from a remote computer.

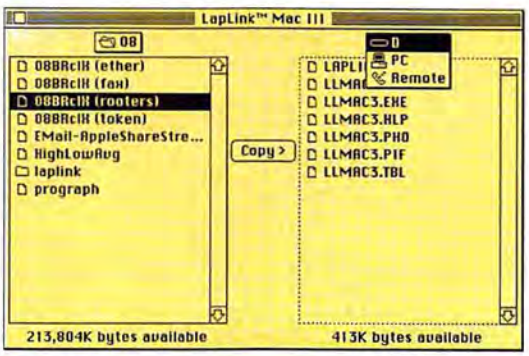


Figure 2: LapLink Mac displays a standard Mac dialog box that shows the files on your Mac and on the computer to which it is connected. Copying a file is a simple matter of selecting it and clicking on the Copy button.

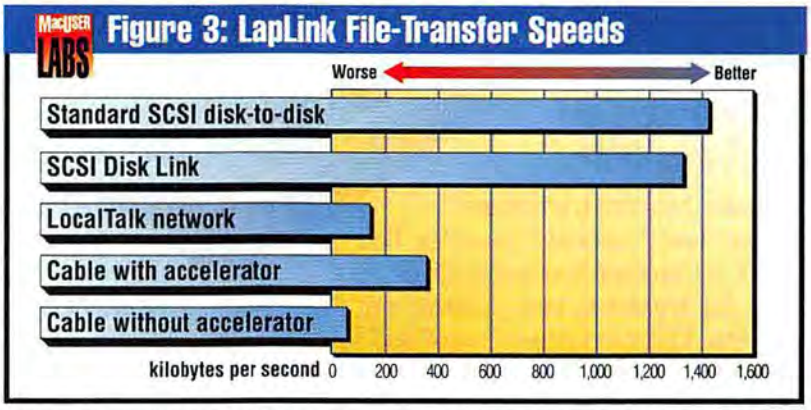


Figure 3: In our file-transfer testing, we moved a 512K file via LapLink Mac's various routes. The disk-to-disk and SCSI Disk Link times were almost identical; the difference in throughput is due to the different hard-disk-drive mechanisms. The direct connection with LapLink Mac's accelerator is still superior to the network connection and the "unaccelerated" direct file transfer. Using the SCSI Disk Link is the best way of moving files with LapLink Mac.

Report Card

LapLink Mac III Connectivity Pac ★★★★½

A comprehensive package that includes a multipurpose serial cable and several software applications that let you copy files from a Mac to another Mac or a PC.

Pros: SCSI Disk Link between a desktop Mac and a Mac Portable is very fast. PC-to-Mac transfers can be controlled from either the Mac or the PC.

Con: Slow Mac-to-PC transfers.

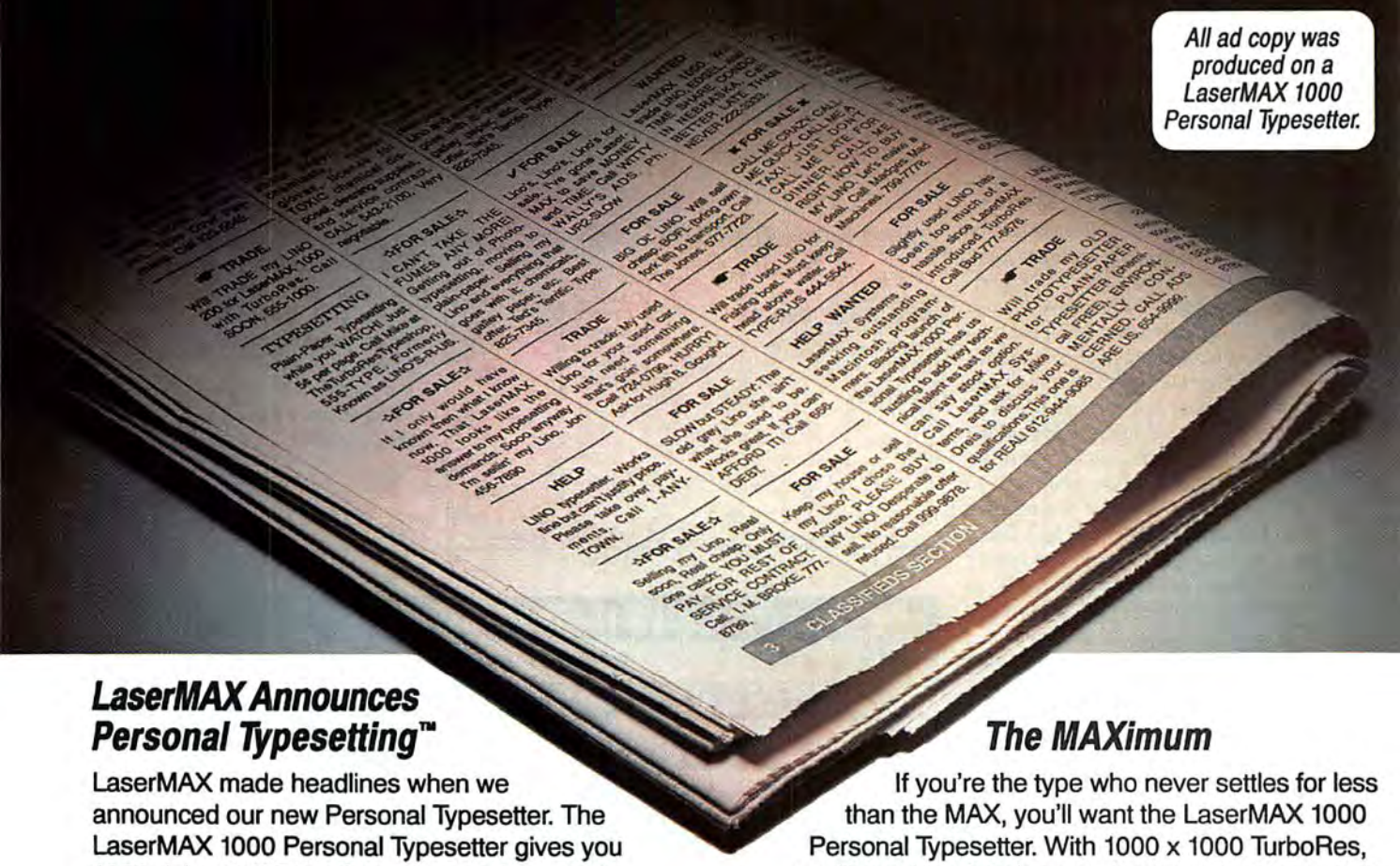
Version: 3.0.

Requires: Mac Plus with 1 megabyte of RAM, System 5.0 or later, and DOS version 2.11 or later.

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probably less expensively) stop at Radio Shack and pick up a 25-wire ribbon cable with male DB-25 connectors at each end.

If the amount of data you need to move justifies the hassle involved in setting up a SCSI transfer, you can amaze your friends and neighbors with its speed.

Mac-to-PC

Previous versions of LapLink Mac required that all transfers between a PC and a Mac be initiated and controlled from the PC side. With LapLink Mac III, either a Macintosh or a PC can now initiate a file transfer in either direction, although some of the special features available for PC-to-Mac transfers are available only from within the PC LapLink application. Mac-to-PC transfers are not as fast as Mac-to-Mac transfers, but the former are certainly a much cheaper solution than attaching an external DOS disk drive, such as a DaynaFile, to a Mac.

Several features of LapLink Mac III enhance the product beyond simple file transfer. Perhaps the best one is its built-in format translation. If you are transferring to the Mac a file that was originally created by a DOS word processor, you can convert its format to MacWrite as you transfer. For text-file transfers, LapLink provides a basic set of file-clean-up options, such as the ability to strip line feeds (PCs use them for line endings; the Mac doesn't) and high-order bits, which WordStar uses for formatting.

LapLink also supports Mac icons. When you copy a PC file to a Mac, you can choose from a list of Mac file-format types (such as Word/text) and applications. LapLink Mac assigns the correct Type and Creator to the Mac file, so the file appears on the Mac desktop with a double-clickable icon for the file type you choose. In the next version, it'd be nice to see LapLink "learn" to always associate a PC file with a specific file extension (for example, *.wp* for WordPerfect) with the same Mac icon.

The Bottom Line

If you use a portable computer, either a PC laptop or the Mac Portable, in addition to your Mac, you should have LapLink Mac. The functionality of SCSI Disk Link and the Mac-to-PC features make LapLink Mac de rigueur for anyone who moves data through any of these paths.

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Networks: Under New Management

Doing surgery on a network is about to get a lot easier, thanks to a host of new network-management hardware and software.



Although the Mac brings with it the promise of plug-and-play networking, all but the smallest networks need management to be effective, whether they are solely AppleTalk or, as is common in large corporate environments, mixed networks of AppleTalk and other protocols, such as TCP/IP and DECnet. Some powerful tools, such as Network General's Sniffer, have been able to examine the inner workings of mixed networks, but these have been both expensive and far from user-friendly. Some slightly more friendly and less expensive tools, such as Apple's Inter•Poll and Farallon's TrafficWatch, have also been available, but they have usually been limited in the types of information they provide and have been restricted to AppleTalk. Powerful Macintosh-based point-and-click network-management tools for mixed networks have, until recently, remained items on a network manager's wish list.

A group of network-management applications due for release this summer — some new, some upgrades — aim at overcoming this problem. There is something to please everyone here, regardless of the type of network, spanning the entire range of prices from $500 to $60,000.

The most significant come from Farallon, which has upgraded its current stable of network-management software and has added some useful new products. Even better is that Farallon now offers everything in a single package called the Network Manager's Toolkit ($995). In addition to new versions of TrafficWatch, CheckNET, and StarCommand, the Network Manager's Toolkit contains two new applications: NetStats and NetAtlas. Also included are instructional videotapes for tips on doing it yourself.

TrafficWatch reads packet-header information, giving you a live graph of how much traffic users are creating. You can save and analyze the data, using the included Excel macros. Now in color, TrafficWatch II can look at a variety of packet types, including EtherTalk packets. You can look for a specific type of packet or error or watch the traffic from a single node. If you want to track down router use, for example, you can look for the ZIP and RTMP packets commonly used by routers. TrafficWatch II can also recognize non-AppleTalk packets, such as DECnet, TCP/IP (UNIX), XNS (3Com), and SPX/IPX (Novell NetWare) packets, although it doesn't provide as much detail for these protocols as it does for AppleTalk.

A new companion to TrafficWatch is NetStats, a scaled-down version of TrafficWatch that works as a DA to give a quick indication of network traffic. NetStats doesn't take over a Mac as TrafficWatch does, and it is limited to monitoring LocalTalk networks.

NetAtlas is a much appreciated addition to the network tool chest. It draws a map of an AppleTalk internet, identifying routers and nodes. It uses different

By John Rizzo

ILLUSTRATION TIMOTHY EDWARD DOWNS

icons to identify user workstations, file and mail servers, Timbuktu hosts, and printers (see Figure 1). It even identifies the types of Macs on a network. Clicking on icons gives you more-detailed information, such as network, node, and socket ID numbers for a network device.

You can run tests to a specific node or between two nodes. NetAtlas can also compare two maps of the internet made at different times and tell you the differences, such as added, missing, or changed node or zone names. It is completely media-independent and works on LocalTalk, Ethernet, token ring, Arcnet, or any other network. Although it can identify TCP/IP nodes, NetAtlas is mostly AppleTalk-based at this time.

A good companion to Farallon's Network Manager's Toolkit is StatusMac from Pharos Technologies. StatusMac lets network managers troubleshoot from the desktop by collecting information on the configuration of individual workstations. This information includes CPU data, such as the ROM version number, the amount of RAM installed, the version numbers of system-software files (System, Finder, LaserWriter, and so on) and applications, whether MultiFinder is running, what SCSI devices are attached, and what NuBus boards are installed. It can even list installed INITs and DAs.

Some users might resent having the eyes of Big Brother on them, but Pharos has taken steps to prevent misuse of StatusMac. For instance, StatusMac doesn't give any information on data files. It also prevents spying by requiring that managers have to ask a user to run a special routine before they can gather information about the user's workstation. Pharos calls this information a Profile. Profile requests can be sent via file transfer or by Microsoft Mail. In either case, the Profile is automatically sent to the network manager when the user runs the appropriate routine. This information is stored in a database against which the network manager can run queries such as "List all the users who have Word installed but are using a version earlier than 4.0" (see Figure 2).

Information on how much StatusMac will cost and when it will ship was not available at press time.

Below the Surface

Developers and others often want to get their hands dirty by digging deeper into protocols. In the past, the only way to do this was to wrestle with expensive DOS-based network analyzers. Now there are similar packages that run on the Mac. Two are programs for monitoring Ethernet networks — NetMinder Ethernet from Neon Software and EtherPeek from The AG Group — and one — MacToken from EDI Communications — is for token-ring nets.

An advantage of software network analyzers over dedicated systems (such as the Novell LANalyzer and the Network General Sniffer) is that you need only carry around a floppy disk instead of a portable PC. You'll also spend much less time reading your manual for Mac software solutions. And they are a great deal less expensive.

Like dedicated hardware tools, NetMinder Ethernet ($495) collects data, decodes it for analysis, and displays it. AppleTalk, TCP/IP, and XNS protocols are supported. NetMinder Ethernet can either sample data or read all the data on a network — Neon calls the latter option the "promiscuous mode." In this mode, NetMinder can read the data in files being transferred over the network that would otherwise be inaccessible to anyone but their creator — a potentially dangerous tool in the wrong hands.

Neon claims that NetMinder Ethernet offers most of the analysis and troubleshooting features of dedicated-hardware competitors. Packet filtering lets you look at specific types of packets. Triggering is a feature that begins data collection at a certain time or upon receipt of a particular filtered packet. Unfortunately, a big drawback of version 1.0 of NetMinder Ethernet is that you can't save or print any of this information. NetMinder Ethernet runs on a Mac II with an Ethernet card from Apple, Asanté, 3Com, or Novell.

The feature set of EtherPeek ($475.99), which was scheduled to ship at the end of July, was not yet final at press time. Still, it appears that this product will be very similar to NetMinder Ethernet and will run on the same Ethernet cards. One difference is that it will run on an SE/30 as well as on a Mac II.

MacToken ($1,500) is a diagnostic tool for a standard 802.5 token-ring network. It can capture or terminate data frames for the whole net or just one node, and it can also display device, zone, and network address and status as well as the time an event occurred. MacToken includes a HyperCard stack that reproduces ring-sequence forms, which IBM-system



Figure 1: Farallon's NetAltas draws a map of an internet with routers, servers, printers, and nodes. The first two icons at the left represent a TCP/IP gateway and a non-Mac IP workstation.

Word Users

	User Name (Users)	Application Name (App)	Creator (App)	Version (App)	Allocated Mem (App)
1	Adams, Roger S.	Microsoft Word 4.0	MSWD	4.0	512
2	Armstrong, Cheryl	WORD	MSWD	4.0	512
3	Benton, Elizabeth A.	Microsoft Word	MSWD	4.0	2,000
4	Burton, Frederick T.	Word 4.0	MSWD	4.0	450
5	Casper, Chris	Microsoft Word 3.01	MSWD	3.01	250
6	Casper, Chris	Microsoft Word	MSWD	4.0	512
7	Christiani, Tony	Word 4.0	MSWD	4.0	512
8	Clausen, Kurt	Word	MSWD	5.01	512
9	Egan, Jim	Microsoft Word 4.0	MSWD	4.0	400
10	Floyd, Carol	Microsoft Word 4.0	MSWD	4.0	400
11	Franks, Carl	MS Word 4.0	MSWD	4.0	512
12	Franks, Carl	Microsoft Word 3.01	MSWD	3.01	300
13	Johnson, Kathleen C.	MS Word 4.0	MSWD	4.0	750
14	Jones, John	Microsoft Word	MSWD	4.0	1,024
15	Kraft, Roger S.	Microsoft Word	MSWD	4.0	512
16	Mulrooney, Kate	MS Word 4.0	MSWD	4.0	512
17	Schoofs, Tim	Microsoft Word 4.0	MSWD	4.0	512
18	Schoofs, Tim	WORD	MSWD	4.0	512
19	Smith, Susan	Word 4.0	MSWD	4.0	750

Figure 2: StatusMac, from Pharos, provides network managers with a wealth of information about system software and applications installed on users' Macs. This information is stored in a database against which the network manager can run queries.

managers use to maintain information about a token-ring network. At press time, MacToken can run only on a Mac II-family machine with Apple's TokenTalk NB card.

DOS Hardware

Network General's Sniffer, a high-end LocalTalk, Ethernet, and token-ring analyzer (which includes support for EtherTalk and TokenTalk protocols), has also been upgraded. Although prices start at $2,500, configurations can cost anywhere up to $60,000. (Network General says the typical configuration, which includes a Toshiba or Compaq 386-based portable and network-interface cards, costs around $20,000.) The new capability, called the Advanced Monitoring Upgrade, currently works for Ethernet only and is free. The monitoring software can be set up to trigger alarms when certain conditions are met, such as idle time for a server or excessive usage by a node on the network. The alarm can be a beep, a printed report, or a logged file.

For those who don't have Sniffer, these monitoring features are available separately as a new program called Watchdog Network Monitor ($1,995), which runs on any AT-class machine. Alarms can be set for up to 1,024 nodes. You can also get information such as average packet size, bytes per second being transferred, and the types of protocols being used on the network — although not the detailed information about protocols and the contents of data packets that Sniffer provides. Watchdog Network Monitor is a bit expensive compared with the Mac software available, and it supports only Ethernet.

Novell's LANalyzer is available in two configurations — as a complete stand-alone unit (an altered NEC Powermate for $19,995) or as an AT board and DOS software ($9,980). Novell uses a specialized board that can capture information about all activity on the network, including collisions as well as valid data packets.

Novell plans a major update this summer that will add keystroke macros to simplify commands, launch applications such as Lotus 1-2-3, and plot data. The function keys are user-configurable and will support an application library. Users will also be able to set alarm thresholds to monitor individual nodes. The alarm can be an audio or visual signal or an automatic phone call to the network



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manager's beeper. LANalyzer operates on Ethernet, token ring, and Starlan.

Finally, a third hardware analyzer — the LANView Network Analyzer ($11,995) from Cabletron — is now available. The company claims that it provides around 80 percent of the functionality of Sniffer but at a much lower cost. LANView supports Ethernet and token-ring networks.

Directory

The AG Group
Station B, P.O. Box 26728
San Francisco, CA 94117
(415) 826-7664
EtherPeek, $475.99

Cabletron
35 Industrial Way
Rochester, NH 03867
(603) 332-9400
LANView Network Analyzer, $11,995

EDI Communications
P.O. Box 160657
Cupertino, CA 95016-0657
(408) 996-1343
MacToken, $1,500

Farallon Computing
2000 Powell St., Suite 600
Emeryville, CA 94608
(415) 596-9000
Network Manager's Toolkit, $995

Neon Software
1009 Oak Hill Road, Suite 203
Lafayette, CA 94549
(415) 283-9771
NetMinder Ethernet, $495

Network General
4200 Bohannon Drive
Menlo Park, CA 94025
(800) 952-6300
Watchdog Network Monitor, $1,995
Sniffer, $2,500 to $60,000

Novell
2180 Fortune Drive
San Jose, CA 95131
(800) 243-8526
(408) 434-2300
LANalyzer, stand-alone, $19,995
LANalyzer, PC kit, $9,980

Pharos Technologies
4243 Hunt Road
Cincinnati, OH 45242
(800) 548-8871
StatusMac, price unknown at press time



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EDITED BY JAMES BRADBURY

Six PostScript Tricks for Word Processors

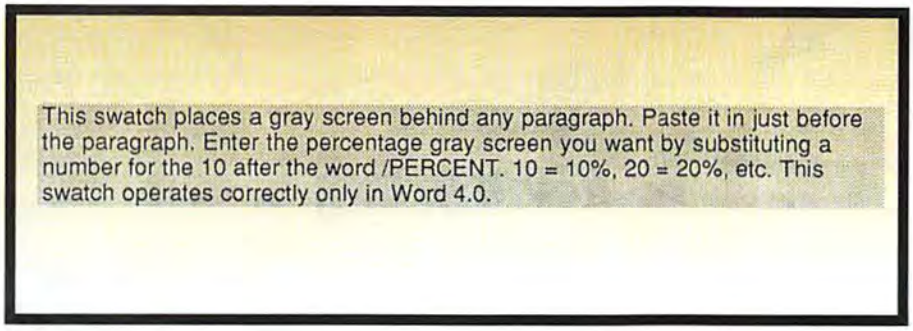
If you have access to a PostScript printer, you can add flair to your word processing with these short routines.

Are you getting your money's worth out of your PostScript printer? People sometimes forget that PostScript is more than a type of printer — it's also a programming language. If you have access to a PostScript printer and can type a few short routines, you can have an instant library of special printing effects.

OK, so you don't really need (or can't afford) all the bells and whistles of a special PostScript utility such as Adobe's SmartArt. That doesn't mean that you can't slip a few PostScript special effects into your word-processing documents. Here's a collection of short but snazzy PostScript routines to choose from, along with some hints on how to use them in your favorite word-processing program. Warning: Be prepared to share the code with all the people who'll be impressed by your fancy printing.

At the end of this article, you'll find details on how to use these routines in different word processors. If you've got Microsoft Word 4.0, these routines are as easy to implement as typing them in and selecting the PostScript style. You may need to make some simple changes to the code so it can work with other word-processing programs.

By Gregory Wasson



Grayed Paragraph

This routine places a gray screen behind any paragraph. Paste it in just preceding the paragraph. Enter the percentage of gray screen you want by substituting a number for the 10 after `/PERCENT` (10 = 10%, 20 = 20%, and so on). This routine operates correctly only in Word 4.



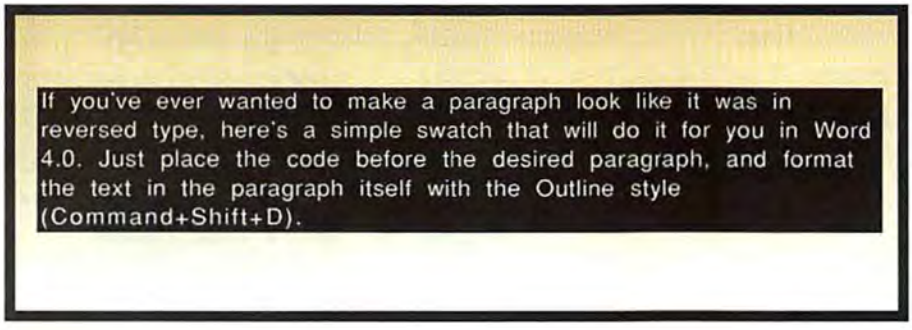
Shadow Text

This routine places text with a shadow behind it wherever you want it on the page. The default font is Helvetica Bold. You can change this by altering the `/font` variable. The default point size is 48. Another way to change it is to insert another point size in the `/pointsize` variable. To specify where the text begins, type the top and left position you want, measuring in points from the top left edge of the page. If you want the text to begin at one inch from the top and left sides of the page, for example, enter `72` for both the `/top` and `/left` variables. If you feel more comfortable working in inches or picas, type the word `inch` or `pica` after the measurement and be sure to put a space between them. Enter the text you want between the parentheses in the `/text` variable.



Memo

This simple routine places a (somewhat egotistical) typographical joke at the top left of a letter-sized page. Customize it by substituting your name for the words "Your Name" in the last line of the code.

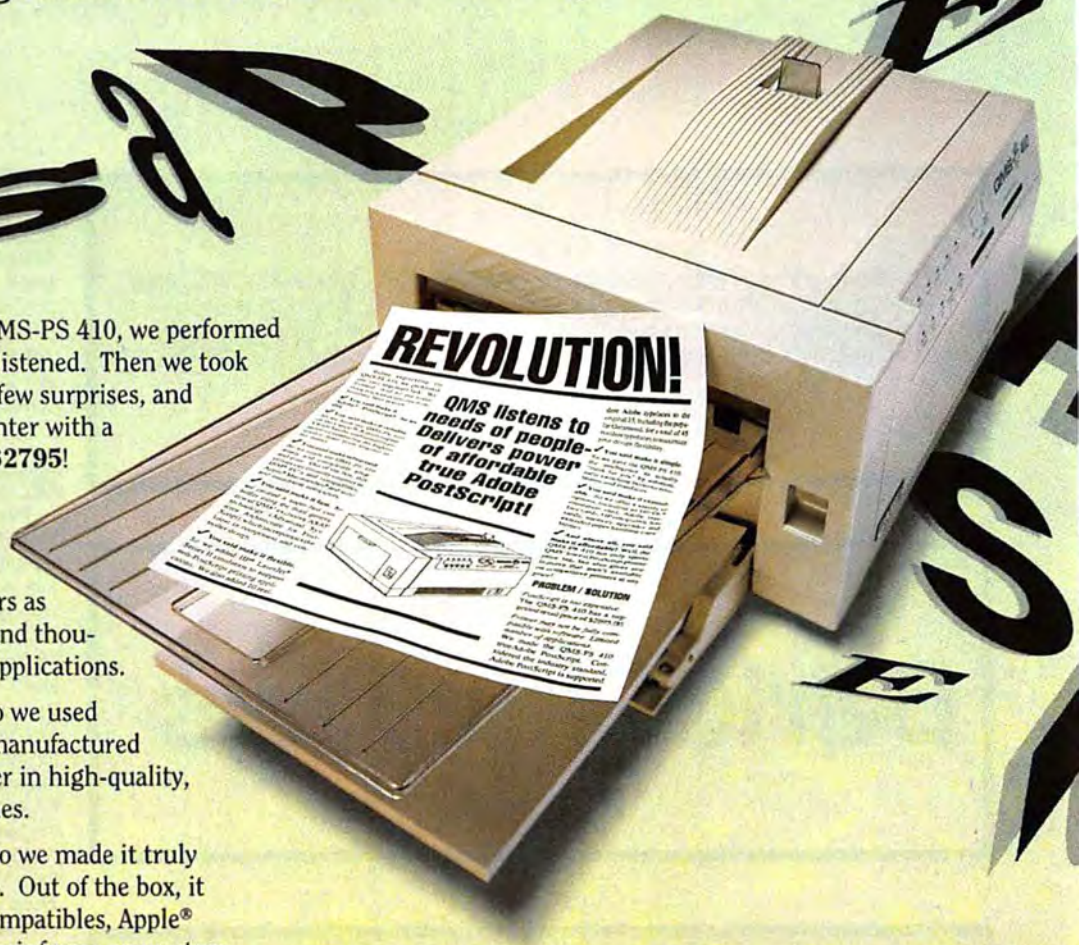


Reversed-Text Paragraph

If you've ever wanted to make a paragraph appear to be in reversed type, try this simple routine for doing it in Word 4. Just place the code before the desired paragraph, and format the text in the paragraph with the Outline style (Command-Shift-D).

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Some Hints

- These effects won't preview on-screen, and they don't generate the desired effects on a non-PostScript printer.
- If you want to change the default font in one of these effects, be sure to use the correct PostScript name for the font. The documentation that came with the font should tell you what the name is.
- If you use a downloadable font in the routine, make sure you download the font before you print. The routines don't support auto-downloading.
- Turn background printing off; otherwise the placement of the graphics might be imprecise in some word processors.
- Save each routine as a separate fully formatted Glossary item (if your word processor supports glossaries), and paste it in as needed.
- If you want an effect to appear on every page (the draft-page routine, for example), place the code in the document's header.
- If you don't want to type code, check our Zmac on-line service for downloadable copies. You'll find all these routines, plus a bonus routine that corrects the cropping example included in the PostScript Glossary that comes with Word 4.

PostScript and Your Word Processor

If you use Word, incorporating PostScript code is easy: Type the text of the code, and then apply the PostScript style to it. (PostScript is one of Word's "automatic" styles.) The default for the PostScript style is Normal + Font: 10 Point, Bold Hidden. You can modify the definition of the PostScript style in any way you like, as long as you keep the Hidden attribute. Word prints these PostScript effects only if you use one of Apple's PostScript laser printers.

For accurate page breaks in Word's Print Preview, be sure to turn Show Hidden Text off by using the Preferences command.

For details on Word 4's special PostScript commands and variables such as `.para.`, `.dict.`, or `wp$box`, see your Word manual or "Word 4.0 and PostScript" (September '89, page 245).

The FullWrite Way

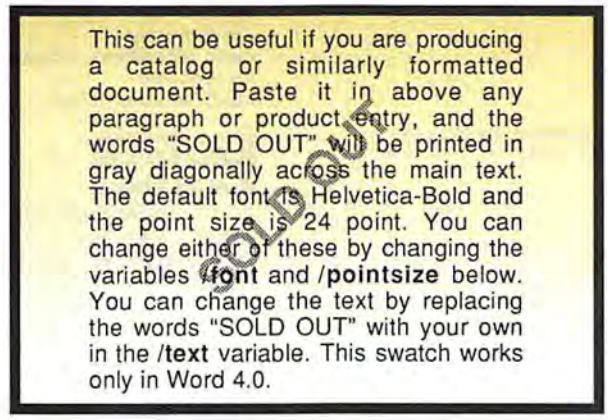
Ashton-Tate's FullWrite Professional offers another way to support PostScript, although its method is not as elegant as Word's:

1. Type in the routine (not one that works only with Word, of course), but add the line `initmatrix` at the top of the file.

2. Save the file in ASCII format (Text Only with Line Breaks).

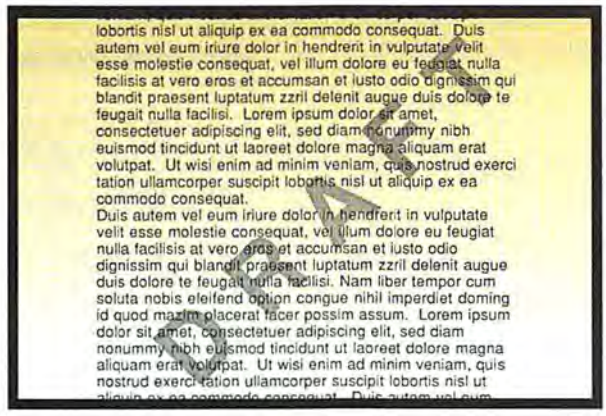
3. Launch ResEdit, select the text file you've just created, and choose Get Info from the File menu (Command-I). Change the file type to EPSF (the Creator should remain FWRT). Close the file (click on OK at the prompt to save the changes).

4. Open the FullWrite document in which you want to use the routine, and choose Print from the File menu. Click on the Print Background Picture box in the Print dialog box. A standard Open dialog box appears. The text file you've just turned into a pseudo-EPSF file should appear in the list. Double-click on it and click on OK in the Print dialog box to print your document.



Sold-Out Paragraph

This can be useful if you are producing a catalog or similarly formatted document. Paste in the routine above any paragraph or product entry, and the words "SOLD OUT" will be printed in gray diagonally across the main text. The default font is Helvetica Bold, and the point size is 24. You can change either of these defaults by changing the variables `/font` and `/pointsize`. You can change the text by replacing the words "SOLD OUT" in the `/text` variable. This routine works only in Word 4.



Draft Page

This routine prints the word DRAFT across a letter-sized page in large gray type. You can change the word to SAMPLE, PROOF, or whatever you want. Just change the text between the parentheses in the `/text` variable. You can also change the default point size (72) or font (Helvetica Bold) at the `/pointsize` or `/font` variables. Two versions are given: one for Word 4 and one for other word processors.



PostScript code fed into FullWrite in this way will print on every page if you're printing a multipage document. If you want an effect on only one page, you must follow these directions and print that page by itself with the Print Background Picture box checked. If you want the effect only on the first page of the document, though, check the First Page Only (Letterhead) box in the Print Background Picture dialog box.

Like Word, FullWrite has some special PostScript features, but they aren't covered in the documentation. For information, call Ashton-Tate's Macintosh technical support at (213) 768-1717 and request Technical Notes 4 and 5 on PostScript and FullWrite.

Other Word Processors

If your word processor doesn't offer PostScript features like Word's and FullWrite's, don't despair. You can probably still use the routines that aren't specific to Word. Simply place or type the code on a page. Type the word **gsave** on the line before the code, and then type the word **grestore** on the line after the code. Select everything, and format it with the PostScript Escape font. This special font is available from the usual freeware sources such as Zmac and CompuServe (look in Library 8 of the MAUG MacDesign Forum. The filename is PSTESC.FNT). The code will become invisible.

When you print the page, the printer interprets the code but doesn't print it. If the effect prints out mirrored, put the code back into a regular font (so you can see it) and type **initgraphics** after the **gsave** (leave a space between them). Select the code again, and change it back to the PostScript Escape font.

Make sure the location specified for the special effect in the code is within the margin of the current page — otherwise the effect might not print.

All the Code That's Fit for Printing

Grayed Paragraph

```
.para.

%-----CUSTOMIZE THE EFFECT HERE-----
/PERCENT 10 def
%-----END CUSTOMIZE----

/convert {100 exch sub .01 mul} bind def
PERCENT convert setgray
wp$box fill
```

Shadow Text

```
/inch {72 mul} def
/pica {12 mul} def
0 792 translate

%-----CUSTOMIZE THE EFFECT HERE-----
/font /Helvetica-Bold def
/pointsize 48 def
/top 72 neg def
/left 72 def
/text (Your Text) def
%-----END CUSTOMIZE-----

left top translate
font findfont pointsize scalefont setfont
gsave
[1 0 1 1 0 0] concat .8 setgray
0 0 moveto text show
grestore
0 0 moveto text show
```

Memo

```
/Helvetica-Bold findfont 24 scalefont
setfont
56 736 moveto
gsave
(ME) show
.7 setgray
(FROM) dup stringwidth rmoveto
-1 1 scale show
grestore
(MEFROM) stringwidth rmoveto
(ME: Your Name) show %Put your name here
```

Reversed-Text Paragraph

```
.para.
wp$box fill
```

Sold-Out Paragraph

```
.para.

%-----CUSTOMIZE THE EFFECT HERE-----
/font /Helvetica-Bold def
/pointsize 24 def
/text (SOLD OUT) def
%-----END CUSTOMIZE-----

/center {dup stringwidth pop
2 div neg 0 rmoveto} def
wp$x 2 div wp$y 2 div moveto
.5 setgray
font findfont pointsize scalefont setfont
45 rotate
text center show
```

Draft Page

Word 4.0 Version:

```
%-----CUSTOMIZE THE EFFECT HERE-----
/font /Helvetica-Bold def
/pointsize 72 def
/text (DRAFT) def
%-----END CUSTOMIZE-----

/center {dup stringwidth pop
2 div neg 0 rmoveto} def
wp$x 2 div wp$y 2 div moveto
.5 setgray
font findfont pointsize scalefont setfont
45 rotate
24 0 text center ashow
```

Generic Version (letter-sized paper):

```
gsave

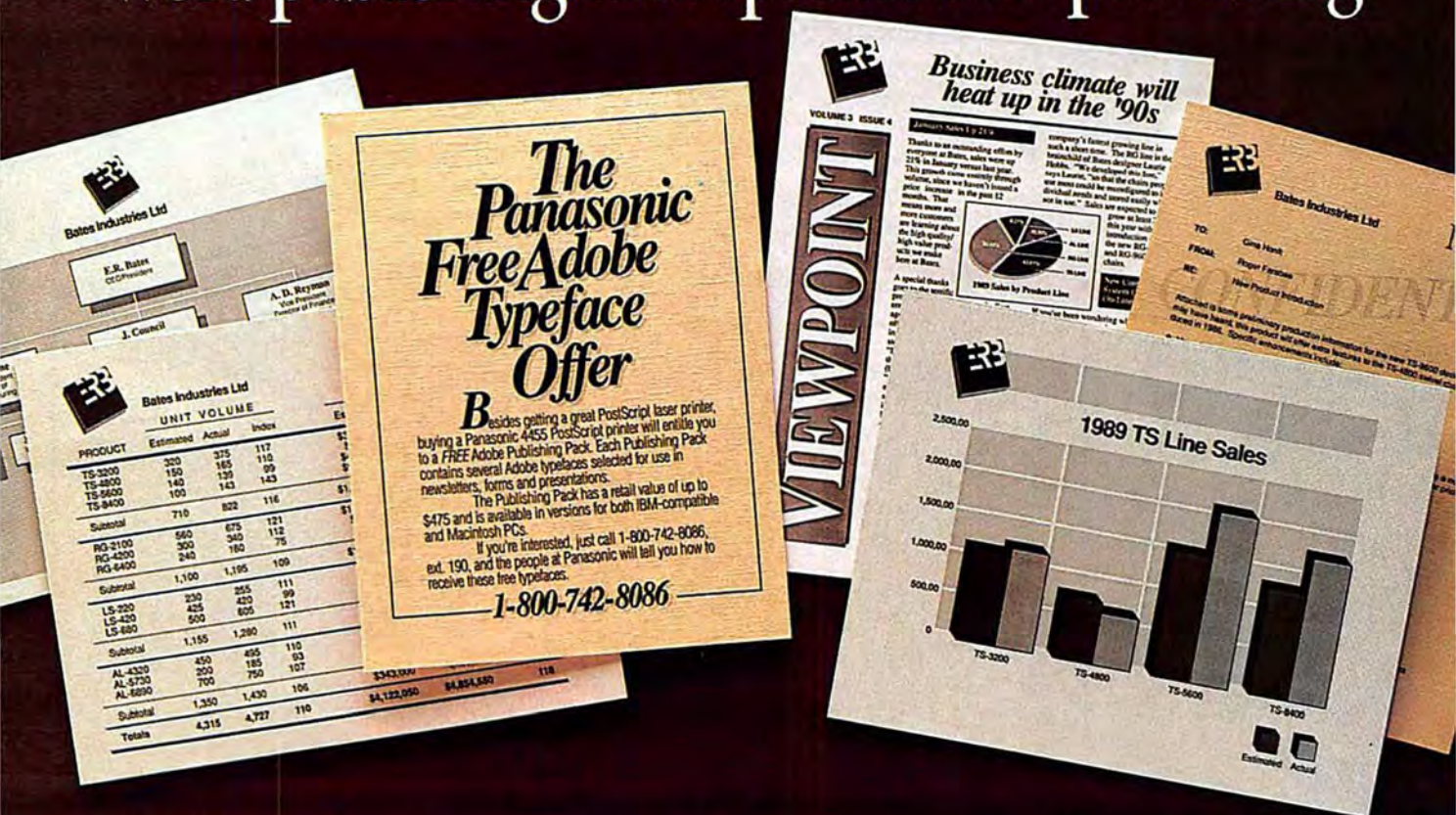
%-----CUSTOMIZE THE EFFECT HERE-----
/font /Helvetica-Bold def
/pointsize 72 def
/text (DRAFT) def
%-----END CUSTOMIZE-----

/center {dup stringwidth pop
2 div neg 0 rmoveto} def
306 396 moveto
.5 setgray
font findfont pointsize scalefont setfont
45 rotate
24 0 text center ashow
grestore
```


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Fonts	39 Adobe PostScript Fonts
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Emulation	HP LaserJet* Series II Diablo* 630

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LPS-MAC

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What You Don't See . . .

What you don't see *can* hurt you. Conversely, knowing about the invisible objects on a disk can help you avoid serious problems. This month we explore the unseen world of a Macintosh disk.

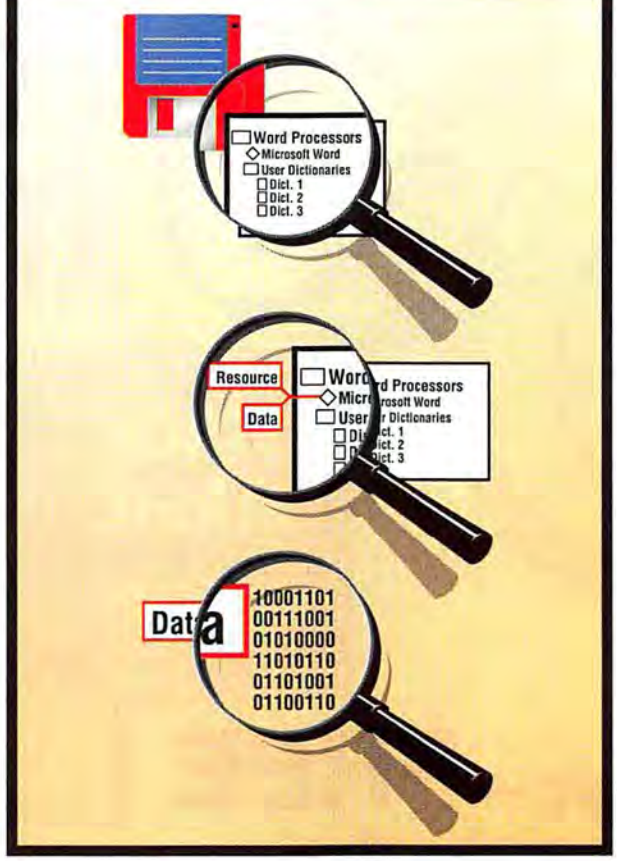
The one invisible object that most people know about is the Desktop file, and what most people know about it is that all their Get Info comments get lost whenever they rebuild the Desktop file.

You can examine the Desktop file with a tool such as ResEdit, and you'll find that it contains many tiny resources with names suggestive of the applications currently or formerly on the disk. The Finder uses them as it keeps track of applications and their documents. Rebuilding the Desktop file brings the information up to date. Type Command-I while examining the Desktop file in ResEdit, and you'll see the attributes of the Desktop file, which may be a little more interesting. Remember never to use ResEdit on an active file.

But you don't have to use ResEdit at all; DiskTop or just about any utility program that lets you modify the characteristics of a file lets you examine the characteristics of the Desktop file. One harmless modification you can do with any such tool is to make the Desktop file visible. It shows up with a generic document icon.

The Desktop file is really a file, but most of the hidden objects on a disk aren't and consequently can't be made visible. Examining them requires a different approach. One useful tool for examining what's on a disk is Disk Editor, a part of Norton Utilities for the Mac.

Looking at Data on Your Disk



One useful tool for examining what's on a disk is Disk Editor, a part of Norton Utilities for the Mac that allows you to examine the structure of your files in ever-increasing detail — from the catalog structure to the bits of the data fork.

By Michael Swaine

The first thing you need to know when you use Disk Editor is that the data on a Macintosh disk resides in consecutive 512-byte sectors. The sector is the basic physical unit of disk storage. As you'll see, the physical arrangement of information on a disk bears little resemblance to the file structure that the Finder presents to you. Visible objects don't necessarily exist on a disk as coherent entities, files may be scattered in pieces all over the disk, and there are invisible objects without which the disk would be useless.

The major invisible objects on a disk are the boot blocks, volume-information blocks, volume bit map, extents tree, and catalog tree. Each of these contains a rich collection of disk attributes. Disk Editor lets you examine each, either by stepping through them sector by sector or by narrowing the focus to examine each individual attribute. Disk Editor not only shows you the values of all these attributes but also explains the function of each.

The first sector on a Macintosh disk contains the boot blocks. This area is read when the Mac is started. The first thing you see in the boot blocks is an item called the signature bytes, which tells the system whether this is a bootable Mac disk; if it is, a special code is stored here. Using Disk Editor, you see that the special code is LK, which happens to be the initials of Larry Kenyon, the designer of the original Mac file system.

Various other information is stored in the boot blocks: the name of the System, Finder, StartupScreen, and Clipboard files (normally, but not necessarily, "System," "Finder," "StartupScreen," and "Clipboard"); the maximum number of files that can be open simultaneously; and the event-queue size, which controls how many events, such as key presses and mouse moves, can be active at one time.

There are even more invisible items in the

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volume-information blocks. Here you can see what type of disk you have: an old MFS volume or a new HFS one. You can see how many files, including hidden ones, are on the disk and how many are on the desktop layer. (The desktop layer is where things reside when you place them out on the desktop. The current version of the operating system doesn't fully support the desktop layer, but see the "System 7 Dog-and-Pony Show" sidebar for a glimpse of how System 7 will handle it.)

The volume bit map shows which sectors of the disk are free and which are assigned, showing a 0 bit for each free sector and a 1 for each assigned one. This can be vital information for recovering deleted or corrupted files. The 0 bits represent available, but not necessarily empty, sectors. A deleted file remains on the disk until it's written over with another file, so there is normally a lot of deleted information still around in the sectors represented by 0s in the bit map. Disk Editor doesn't teach you how to recover deleted files, which is a complicated process, but it gives you all the prerequisite information you need for a course in file recovery. Perhaps I'll hold such a course in this space soon.

The visible objects on a disk exhibit surprising complexity when examined under Disk Editor. A single file does not necessarily occupy a contiguous block of disk space: Large files that have been modified many times are often highly fragmented and scattered over discontiguous blocks of disk segments. The extents tree is the data structure that tracks this fragmenting, and the catalog tree keeps track of the names and locations of files. Both trees are necessary to map the directory structure that you think represents the organization of your disk onto its true organization. Disk Editor lets you follow the branching of these trees.

Files themselves have hidden components, and Norton Disk Editor is useful for examining and modifying them.

First, there are the file attributes of every application, document, and folder on your disk. A file has an attribute indicating whether or not it is visible (the Desktop file is normally invisible); if the file is in the desktop layer (that is, on the desktop); and whether it is locked, protected, in use, cached, open, or a System file. Among these attributes, you find the Bundle bit and the Bozo bit: The former tells you whether the file has an icon associated with it; the latter is an early form of copy protection that is no longer used.

Every file also has forks. The structure of a Macintosh file distinguishes between and physically separates two types of



Contest Winners

In May I asked, "How heavy is a megabyte?" (see "Pound for Pound" in Beating the System, page 307.) George Taniwaki wins the T-shirt for submitting the stats in Table 1, but the competition is not yet closed. If anyone satisfactorily removes the question marks in George's table, provides significantly more (or better) numbers, or supplies comparable figures on the cost of a megabyte, I have a second T-shirt waiting.

It's worth noting that, by the criterion used here, a 256K RAM chip is only about six times as efficient as typewritten text on good bond paper and roughly equivalent to newspaper text.

Send your solution to:

Michael Swaine
c/o *MacUser*
950 Tower Lane
18th Floor
Foster City, CA 94404

Table 1: How Heavy Is a Megabyte?

	Capacity	Weight	Efficiency (MB/lb)
Paper			
Hollerith card	80 bytes	0.2 oz	0.00625
Paper tape, 10 feet	960 bytes	0.8 oz	0.182
Typewritten pages, 1 ream	1.2 MB	5.5 lb	0.217
Newspaper, without photos	1.8 MB	1.3 lb	1.39
Softcover book, no pictures	450K	5.0 oz	1.41
Telephone directory	19 MB	4.5 lb	3.85
Street map	8 MB??	1.5 oz	83.3
Film			
Microfiche of typewriting	100K	0.10 oz	1.56
Microfilm, 1 roll	300 MB	10.5 oz	454
Linotronic 300 film, 5 x 7	27 MB	0.25 oz	1,720
2,000-dpi 35mm slide	3.8 MB	0.03 oz	2,040
Scitex res-24 film, 5 x 7	80 MB	0.30 oz	4,350
133-lpi halftone neg.	100 MB??	0.30 oz	5,260
Continuous-tone B&W 35mm neg.	300 MB??	0.03 oz	161,000
35mm color slide	1 GB??	0.03 oz	556,000
Magnetic			
Bernoulli drive	20 MB	4.5 oz	7.14
5.25-inch floppy disk	180K x 2	0.6 oz	9.00
3.5-inch floppy disk	400K x 2	0.8 oz	15.6
9-track IBM tape	240 MB	14 lb	17.2
5.25-inch HD floppy disk	720K x 2	0.6 oz	37.0
1-inch videotape, 1 hour	920 MB?	11 lb	83.3
Cassette tape, 90 minutes	4.9 MB x 2?	1.5 oz	105
SyQuest cartridge	44 MB	6.5 oz	109
VHS tape, 2 hours	1.8 GB?	8.5 oz	3,450
8mm videotape	2.2 GB	2.2 oz	16,400
4mm DAT	1.3 GB	1.1 oz	19,200
Optical			
Rewritable optical disk	300 MB x 2	4.5 oz	2,130
WORM disk	400 MB x 2	4.5 oz	2,860
12-inch videodisc, 2 hours	1.8 GB?	5.5 oz	5,260
CD-ROM disc	650 MB	1.5 oz	7,140
Electronic			
Relay switch	1 bit	5.5 oz	0.000000345
Vacuum tube	1 bit	1.5 oz	0.00000127
Transistor	1 bit	0.2 oz	0.00000909
256K RAM chip	256Kbit	0.4 oz	1.25
1-MB RAM chip	1M bit	0.4 oz	5.00
Miscellaneous			
Clay tablet	1K?	4.4 lb	0.000222
33-rpm phonograph record	30 MB x 2?	4.5 oz	213
Human brain	20 GB??	3.5 lb??	5,880
Xenon atoms on nickel	2 bytes	1 e-23 gr	555 e24

information. The data fork of a file contains all the running text, for example, of a word-processing document, plus formatting information and other data. The resource fork contains packets of information in forms the Mac knows about, such as fonts, dialog boxes, text strings, and code. Every application has a resource fork and may have a data fork; every document has a data fork and may have a resource fork. Disk Editor lets you examine files and follow either fork.

This brief look at one component of Norton Utilities for the Mac doesn't do justice to the product. Count on seeing a review soon, and also count on a further exploration of the Mac via Norton Utilities right here next month.

The System 7 Dog-and-Pony Show

You've grown bored with the routine of innovation, jaded with change. You sense when the next rev is due and grow testy if it's late. Too many demos, too many sneaks, too many nondisclosure agreements. Not only can't you have it yet, half the time you can't even talk about it. You have seen the future, and it has warped you for mundane life. You scorn any technology you can actually have.

Is this the attitude for Northern California, or what?

Tonight you'll attend another Silicon Valley alpha demo; you'll drive the Honda one more time from Eichlerville to Hermann Millerland; you'll drink the coffee that you know you'll regret, take the notes that will be indecipherable in the morning. Tonight you're going to see System 7. You'll like what you see, you'll want it now, and tomorrow you'll have to force yourself to use your computer with its insufferably archaic operating system.

There's still time to call a friend and spend the evening stargazing. It's a clear night. You don't have to do this.

All right then. I warned you.

Pronounce It *Seven Dot Oh*

The first thing you notice is that the demo is being conducted on a IIfx. Typical. You tell yourself to dampen your enthusiasm for the software by a factor of 3 to allow for the fast hardware, but you know you won't.

The demo starts with little things: subtle changes in the way windows act. When you zoom a window now, it doesn't fill the entire screen; it leaves the disk and Trash icons visible. Band selecting can extend beyond the border of a window now; the window borders are hot, and the window scrolls when it's appropriate without making you use the scroll bars. There are more ways to navigate on the desktop. The arrow keys jump you from icon to icon in a window, and typing one or more letters of a file's name will select it.

There are bigger issues involved, but the demonstrator keeps the discussion on the level of particular features and capabilities. The Control Panel is now a folder, and all the cdevs have clickable icons. He pulls down a menu from the icon on the right end of the menu bar and gets a list of available applications. This menu can hold more than applications, though: DAs, documents, and the Control Panel can be installed here without rebooting.

You're pleased to see that the desktop layer is now recognized by the standard file dialog. This means that a request for a file under the Finder — or any application — recognizes that certain files are on the desktop. Select the desktop layer, and you see these files, as well as all the mounted volumes.

The new Trash can gets a lot of attention. The Trash no longer empties on its own; you must consciously empty it, and even then you must confirm your decision. The confirmation dialog lets you know what you're eliminating. The demonstrator says that the Trash is now a folder like any other, and someone wants to know if its window will stay put when you reboot. The demonstrator doesn't know, so he reboots the machine, and . . . yes! There's the Trash window, opened and positioned exactly as it was before the reboot. There is applause. These people need a night off.

Some features deserve more demonstration than they get: You know that file sharing, the Help Manager, and the finding capability of the Finder are significant new features, but the demonstrator slips through them quickly. Apparently they are not yet fully functional. You see only the naming function of the Help Manager. Turn on Help, point at anything, and you are told what it is. Applications will have the same use of the Help Manager, and it will have other functions, so the ultimate effect will be a uniform system of on-line documentation. You see only a glimpse of that tonight.

You know that you can search on various criteria under the Finder, but the labeling aspect is news. You can, for example, assign names to colors, assign colors to icons, and then search on the names. File sharing is now built into the Finder too, but you don't see that tonight.

Aliasing is a feature that should be very useful. You can create an alias file that is just a pointer to another file. The alias has an icon and can be placed in a different folder from that of the file it aliases. Click on either the original or the alias, and the effect is the same: You invoke the original. Someone asks if you can alias an alias, and this is demonstrated.

The information stored in a file's Get Info box is no longer lost when you rebuild the desktop. This gets applause too.

The demonstrator finally gets to fonts. Fonts, it becomes clear, are placed in the System file. This arouses some consternation. Most of the attendees use Suitcase or some such utility for managing fonts; will these be incompatible with System 7? The answer is not a simple yes or no. The new TrueType (a.k.a. Royal) fonts use less space than bit-mapped fonts, and anyway they aren't stored in the System file but are registered there and loaded into memory when needed. What's not clear from this demo and, you suspect, will not be clear until System 7 is released, is how the new system will work with old fonts.

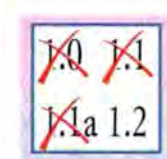
But then, you plan to convert immediately to the new fonts. This is not your first look at TrueType fonts, and you continue to like what you've seen.

That's it. The demo's over. There are a lot of features you didn't see: interapplication communication, for example. This, though, is plenty. You'll be miserable tomorrow.

A ValSpeak Glossary







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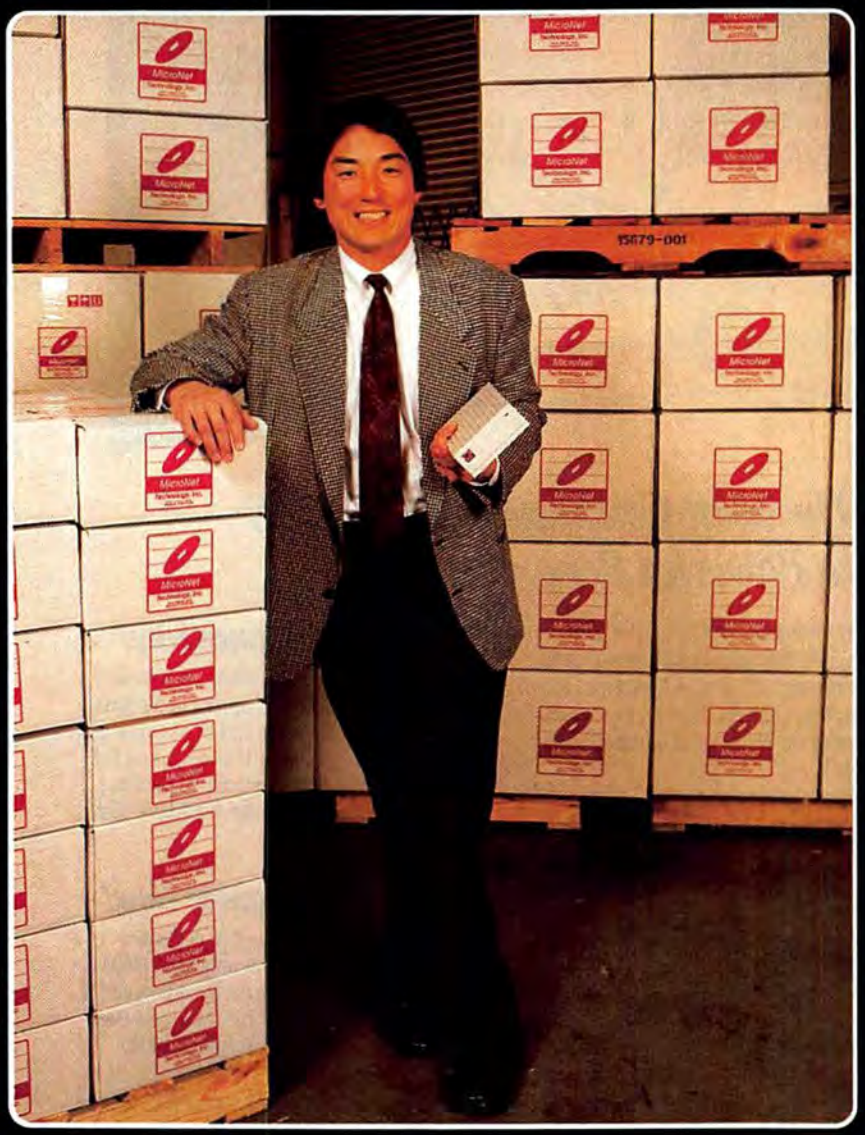
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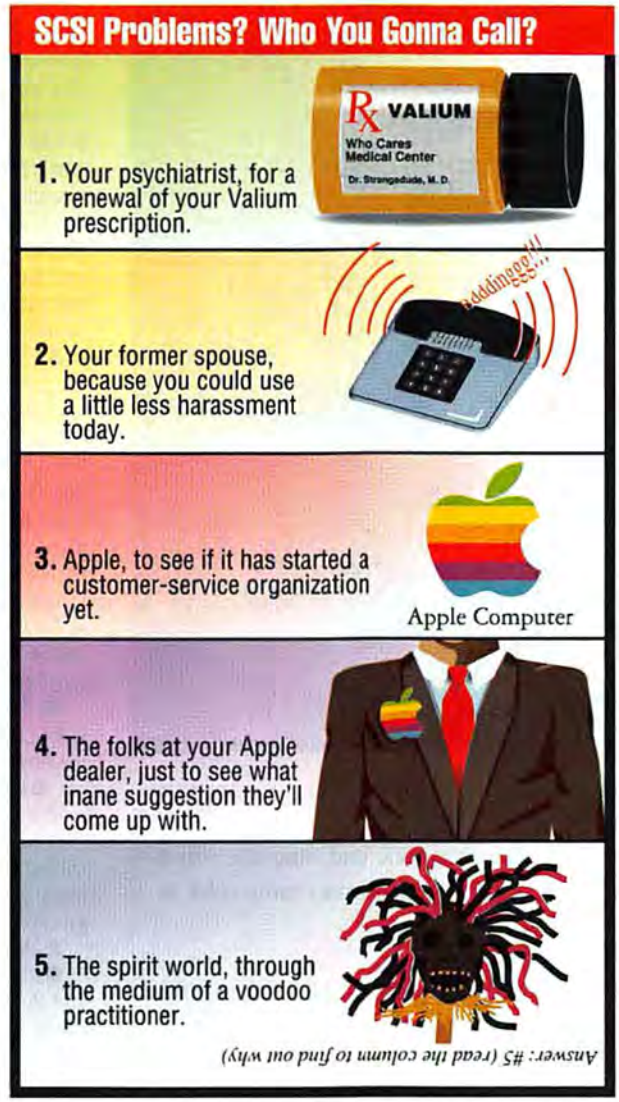
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THE EXPERT'S EDGE

A Beginner's Guide to Daisy Chains

You need knowledge, patience — and voodoo — to connect SCSI devices properly.



My computer system is starting to look like a giant plasticized pyramid. At the base, you'll find the wide polycarbonate case of a Mac II. Just up from that is the slightly less wide case of a dual-drive Bernoulli Box. (Sure, it has metal sides and top, but all I can see is the cheap plastic bezel on the front.) On top of the Bernoulli sits an SE-width Cobra 215e hard-disk drive. And at the very top, you'll find a narrow little CD-ROM drive.

Cute, eh? Sure, but don't look behind the pyramid — you'll find 14 cables of varying types, all tangled into a mess that makes a plate of spaghetti look organized. Don't ask how long it took to get all four of my SCSI devices talking the way they're supposed to. Well, maybe you should ask, since connecting SCSI devices is the subject of this month's missive.

When your SCSI chain doesn't work, only one of these choices offers the best chance of getting it running.

By Thom Hogan

And just like most pyramids, this month's topic is full of intrigue, mystery, and awe-inspiring wonder.

The Apple Way

Apple's directions are short and to the point: You can connect up to seven SCSI devices by simply plugging in the cables correctly and making sure that only the first and last devices in the cable chain are terminated. Apple simplifies even that statement by adding that it has already terminated its own internal hard-disk drives.

Great — plug in the cables and remove the termination packs from all but the last device. This should take all of about ten minutes, even if you have a full complement of SCSI goodies.

Well, forget Apple's advice. It doesn't work. To make matters worse still, SCSI-device-addressing and -termination methods vary from manufacturer to manufacturer, making even supposedly trivial installations a half-day job for the unwary. And if that isn't enough, wait until you find out that your Mac works properly only with the middle device in the chain terminated! (Yes, I've run into at least two combinations of equipment that worked only this way. Curiously, both involved SCSI-equipped scanners.)

Forget the Apple Way

Frank Sinatra was right — you should do it My Way. First, make sure you have the right tools. Anyone experimenting with SCSI connections should have two things: a couple of

extra daisy-chain cables of varying lengths and a termination-pack connector (a SCSI-port connector with the resistors built into it and no cable emanating from it). Why? Well, the varying cable lengths can sometimes make a difference, although I'm at a loss to explain exactly why. Second, using the external termination pack is handier than fiddling with internal terminations, and it allows you to experiment with termination in various places in the chain.



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Now on to the task at hand:

1. Assign SCSI IDs. The Macintosh is device 7. Make sure that each SCSI device you install has a unique ID. Don't forget the internal drive, if you have one (you can't always set it, but it does have an ID!).

2. Remove the termination from all the external devices you're going to connect. Most vendors use external terminators, which you plug into or unplug from the external SCSI connector. Other manufacturers force you to perform surgery by removing an internal terminator. The internal terminator varies from device to device, but it's usually a small, black, rectangular object that has ten or more pins plugged into a socket on a circuit board. To those companies: Boo, hiss! Stop paying lip service to the words "customer support," and give us some real support for a change: Make equipment that we don't have to dismantle to install.

3. Start your daisy chain from the Mac. Perhaps I'm a bit overzealous, but I usually chain devices in the order of their SCSI IDs. This shouldn't make any difference in actual use, as SCSI standards don't specify that devices must be in order in the cable chain; doing it this way pleases me, however, and provides me with a sense of order just prior to my screams of "Why doesn't it work?!?!"

On the second set of connectors of the last SCSI device in the chain, plug in your termination pack.

4. If everything works, fine — consider yourself lucky and think of me as the boy who cried wolf. Experience tells me that more than half of you are still reading, however.

If things aren't working, there's a whole sublist of things you need to check to make sure that you haven't made any kind of mistake:

A. Recheck the IDs.

B. Reseat all the cable connections and make sure that they're all snugly in place, with the retainers locking them into the connector.

C. Measure the total length of your cable — Apple doesn't mention a maximum length, but anything more than about 15 feet is likely to start causing you problems, because the line drivers Apple uses in the computer are easy to overload.

D. Make sure all the devices have their power turned on.

E. Check to see if the device you're having problems with uses a software

driver; if it does, make sure the driver is properly installed in your System Folder, as some devices (such as my CD-ROM drive) won't appear on the desktop without the driver's being activated.

5. Try reordering the devices by changing the order in which the cables are sequenced. I've often found that putting an oddball device such as a scanner at the end of the daisy chain suddenly makes it work. Simply moving cables around or trying cables of a different length also sometimes makes a setup function.

6. OK, things are getting serious. Just for fun, I decided to check out Apple's *Macintosh Family Reference* to see if its description of SCSI control had any interesting tidbits to offer. Surprise, surprise — it did: "A SCSI network with multiple peripheral devices, or more than approximately three feet of total cable length, may require two sets of termination resistors: one set at either end of the SCSI network."

May require? Not *does* require? All right, so the next thing to try is to remove all external termination, especially if you have only two external devices hooked up. Still no go? Check the internal drive if you have one. Is it terminated? Yes. Well, remove that termination. Try again. Still no go? Replace the termination at the external end of the daisy chain. Still no? Where's Sherlock when you need him?

7. You're now outside of "official Apple policy." First, let me state that under no circumstances should you have three or more terminations active in the SCSI chain, lest you damage the driver chips on the motherboard — and you know how much motherboards cost. Try moving the terminator on the last device from the empty connector to the connector with the cable. If this doesn't work, your only other option at this point is to start moving the termination point around on the chain. Keep moving it from device to device until you get the system to work. Remember, I know of several cases in which the middle device in the chain had to be terminated to get the whole thing to work. If this doesn't solve the problem, you need professional help (your local Apple dealer, for example) or you need to go back through these steps to make sure that you didn't overlook something.

Tell Me Why

Usually the first question I get after someone goes through the SCSI Installation Dance is "why?" (The Mac seems to have a way of getting everyone to sound like a four-year-old, doesn't it?) I rarely ask such questions, since I'm basically a pragmatist at heart. But let me take a shot at the answer (no guarantees that I'll hit the mark, however).

Computer makers tout the "digital" nature of their beasts, but there's really no such thing as digital if you take a real close look at what's happening inside your machine. When nothing's happening on a SCSI line, that line is supposed

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to be kept at exactly 5 volts (that's what the termination packs are supposed to do: pull the voltage up to that level when nothing is happening).

When a digital bit travels down the line, the voltage drops. At issue are several things: How fast the voltage drops to the new level, whether all devices see the drop at the same time, how fast the voltage returns to 5 volts after a signal has passed, and several other "analog" types of things.

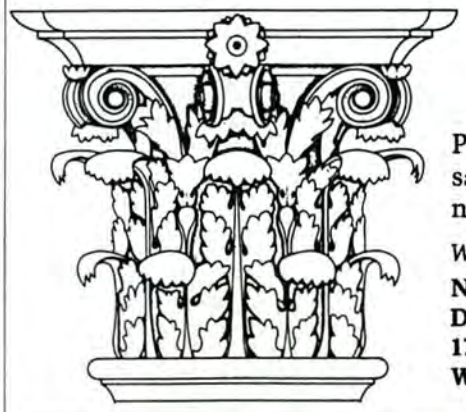
Apple didn't help matters by leaving off several of the ground wires in the connector at the back of the Mac (which explains why the Mac has a DB-25 connector on it while all other SCSI devices tend to have 50-pin cinch connectors). Ground is a reference value against which all other signals can be compared.

The result is that all kinds of factors play a part in whether or not a voltage drops and returns to 5 volts in a manner that the electronics recognize as a "bit" of information. A poorly insulated or poorly grounded cable can have an effect, as can the actual resistance of the termination pack (electronic parts are available in a wide range of tolerances) and marginal resistors in the termination pack. A really long daisy chain can introduce side effects, because electricity has to traverse the distance, and by the time it does, another device (such as the termination pack) might be trying to send a new signal over that line. Some SCSI- device vendors provide a voltage to the SCSI connector, and others don't.

Get the idea? Electronics is not a carefully ordered world in which something is always on or off. Instead, electronics is a voodoo art of dealing with timing, sequencing, trigger valuing, and a whole range of other varying factors. And SCSI connections are voodooier than, say, printer connections.

There, did that satisfy you? You always knew that things weren't quite as black-and-white as the manuals made them out to be. Now you have the explanation: It's voodoo. All of which brings me to my last suggestion. If your SCSI devices still aren't working, maybe you should try calling a doctor. Which doctor? Why the witch doctor, of course.

Thom Hogan practices amateur voodoo at Macreations and is the publisher/editor of *The Macintosh II Report*. You can obtain a sample copy by sending $2 to Macreations, 329 Horizon Way, Pacifica, CA 94044.

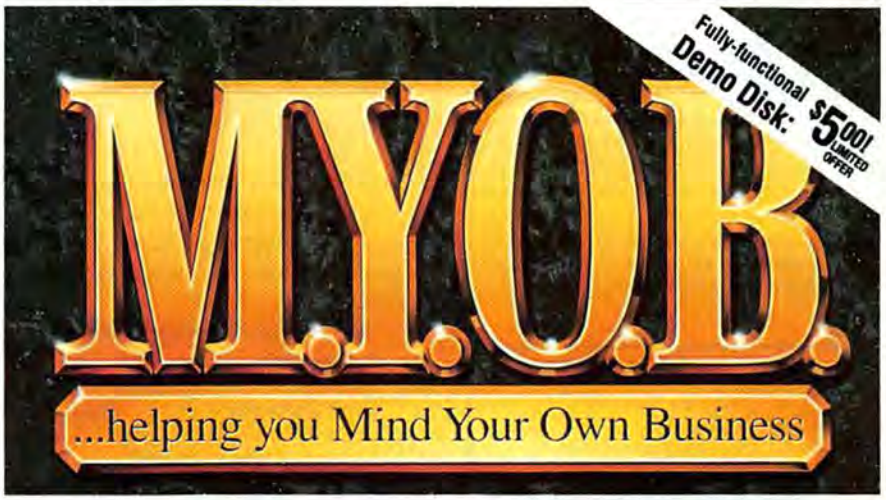


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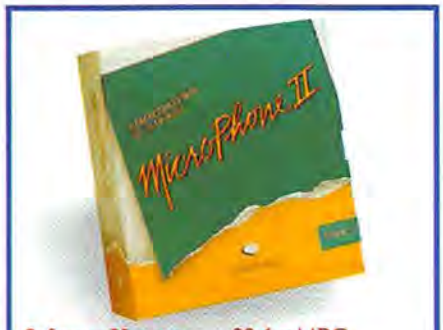
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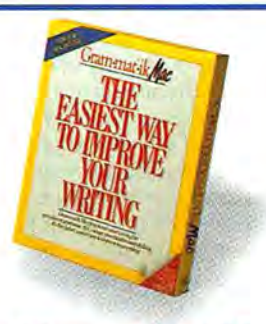
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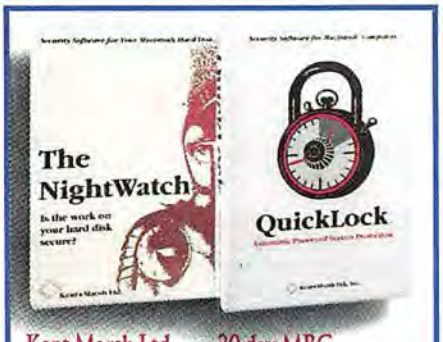
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★Softstream Int'l., Inc. ... 30 day MBG
6513 Authenticate & Mutate ..... 79.
5440 HyperHIT 2.2 ..... 125.
★Somak Software ... 30 day MBG
5897 ScriptEdit 1.1 ..... 49.
★Spinnaker ... 30 day MBG
6692 PLUS 2.0 ..... 115.
★Symantec ... 30 day MBG
4644 Just Enough Pascal 1.0 ..... 52.
3421 THINK Pascal 3.0 ..... 165.
3420 THINK C 4.0 ..... 165.
★Symmetry ... 30 day MBG
3318 HyperDA 1.2 ..... 45.
★TGS Systems ... 30 day MBG
6667 Prograph 1.2 ..... 125.
★TML Systems ... 30 day MBG
3549 TML Pascal II 3.1 *(w/MPW 3.1)* ... 109.
Trendware
HyperTools #1 or #2 ..... *each* 52.
True BASIC, Inc.
3587 True BASIC 2.02 ..... 55.
★Zedcor ... 60 day MBG
3985 ZBasic 5.0 ..... 88.



HJC/Microcom ... 30 day MBG
4803 *Virex with the Virex INIT*–Both detects and repairs files infected by all known Macintosh viruses. The Virex INIT continuously monitors the computer to prevent infection ..... $56.
5885 *Virex 10 Pack* ..... 329.

UTILITIES

★Abbott Systems ... 30 day MBG
5236 CanOpener 1.1 ..... 63.
★Affinity Microsystems ... 60 day MBG
1016 Tempo II 1.02 ..... 93.
★Aladdin Systems ... 30 day MBG
6169 Shortcut 1.0.2 ..... 46.
6740 StuffIt Deluxe 1.0 ..... 63.



Symmetry ... 30 day MBG
6069 *KeyPlan 1.0*–1989 MacUser Editors' Choice Award for *Best Information Management Software*. All the tools necessary to create, analyze, fine-tune, present and track plans from outline to deadline ..... $243.

★ASD Software ... 30 day MBG
7085 FileGuard Extended 2.5 *(1 user)* .. 145.
★Berkeley Systems ... 30 day MBG
5737 After Dark 1.1C ..... 22.
1541 Stepping Out II 2.02 ..... 49.
★Bravo ... 30 day MBG
5404 SPAMM 1.1 ..... 48.
★Casady & Greene ... 60 day MBG
2269 QuickDEX 1.4D ..... 31.
★CE Software ... 60 day MBG
4689 MockPackage Plus Utilities 4.4 .... 31.
1727 CalendarMaker 3.0 ..... 31.
6278 DiskTop 4.0 ..... 63.
1729 QuicKeys 1.2 ..... 63.
★Central Point ... 30 day MBG
5040 Copy II Mac 7.2 ..... 23.
5041 Mac Tools Deluxe 1.1 ..... 75.
★Connectix ... 30 day MBG
6123 Virtual 2.03 (for SE/30, IIcx, IIx, & IIci) 115.
6122 Virtual 2.03 (for Mac II, incl. PMMU) . 188.
★Dantz Development ... 30 day MBG
5255 Retrospect 1.1 ..... 149.
Dubl-Click Software
6653 MenuFonts 3.0 ..... 30.
1824 Calculator Construction Set 2.05 ... 45.
★Electronic Arts ... 30 day MBG
1843 Disk Tools Plus 1.01 *(Batteries Incl.)*. 31.
★Fifth Generation ... 30 day MBG
4287 PYRO! 4.0 *(screen saver)* ..... 25.
3954 PowerStation 2.5.2 ..... 37.
3955 Suitcase II 1.2.5 ..... 49.
5178 FastBack II 2.1 ..... 118.
5725 DiskLock 1.0.2 ..... 118.
★HJC/Microcom ... 30 day MBG
4803 Virex *(lastest version)* ..... 56.
5885 Virex *(10 Pack)* ..... 329.
ICOM Simulations
4084 On Cue 1.3 ..... 35.
★Insight Development ... 30 day MBG
6171 MacPrint 1.2 ..... 94.

★JAM Software ... 30 day MBG
6089 Smart Alarms w/Appt. Diary 2.9.1. $49.
6088 Smart Alarms 3.02 *(1-4 users)* ..... 99.
6087 Smart Alarms *(5-8 users)* ..... 149.
6086 Smart Alarms 3.02 *(9-15 users)* ... 199.
★Kent Marsh Ltd. ... 30 day MBG
5457 QuickLock 2.0 ..... 34.
2591 The NightWatch 1.03 ..... 85.
6134 MacSafe II ..... 107.
★Kiwi Software ... 60 day MBG
6267 KiwiEnvelopes! 3.0 ..... 34.
★Loop Software ... 30 day MBG
5442 PictureBook 3.2 ..... 39.
Magic Software
7267 AutoSave II 1.1 ..... 28.
7268 POWERicons 1.0 ..... 39.
7269 POWERmenus 1.1 ..... 39.
7270 Backmatic 1.1 ..... 50.
★Microlytics ... 60 day MBG
2732 GOfer 2.0 ..... 45.
★Microseeds Pub. ... 60 day MBG
7068 INITPicker 2.0 ..... 35.
4210 Screen Gems 1.0 ..... 39.
2913 Redux 1.62 ..... 49.
7116 Rival 1.1 ..... 49.
★Now Software ... 30 day MBG
6924 ScreenLocker 1.0 ..... 45.
6925 Now Utilities 1.0 ..... 89.
Olduvai
4503 MultiClip 2.0 ..... 49.
★ON Technology ... 1 year MBG
6385 On Location 1.0 ..... 75.
★Peter Norton ... 30 day MBG
6748 Norton Utilities for the Mac 1.0 .... 84.
★Software Innovations ... 30 day MBG
5869 HandOff 1.1 ..... 31.
6647 HandOff II ..... 52.
★Solutions, Inc. ... 60 day MBG
3448 SmartScrap & The Clipper 2.1 .... 45.
3449 SuperGlue II 2.01 ..... 61.



Lifetree Software ... 30 day MBG
6984 *Correct Grammar 1.0*–Rated top grammar checker (4½ Mice) by *MacUser* (6/90). Checks each sentence & highlights mistakes in grammar, style, punctuation & spelling. Suggests corrections before your boss does ..... $51.

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ASD Software ... 30 day MBG

7085 *FileGuard Extended 2.5*–Protect your hard drives, applications, files/folders (including system folder) from unauthorized access, deletion, and/or illegal copying. Now with system usage audit trail..... $145.

★SuperMac Tech. ... 60 day MBG

3383 SuperSpool 5.0 ..... 58.
3382 SuperLaserSpool 2.02 ..... 87.
3378 SuperLaserSpool 5-Pack 2.02 ... 289.
3377 DiskFit 1.5 ..... 58.
3379 Network DiskFit 1.5..... 225.
3381 Sentinel 2.0 ..... 87.

★Symantec ... 30 day MBG

5176 Symantec AntiVirus for Mac *(S.A.M.)*.. 67.
5724 Symantec Utilities for Mac *(S.U.M.)* ... 99.

★Synex ... 30 day MBG

6665 MacPhonebook 2.0 ..... 51.
7147 MacEnvelope 5.0 ..... 57.
6666 MacEnvelope Plus 2.0 ..... 159.

★Williams & Macias ... 30 day MBG

6926 myDiskLabeler III 3.0 ..... 49.
3780 ImageWriter II Label Pack *(Qty. 216)* 15.
3781 LaserWriter Label Pack *(Qty. 216)* .. 18.
4976 StickyBusiness 1.2 ..... 89.
6927 StickyBusiness Plus 1.2 ..... 149.

XTree

5177 XTreeMac 1.02 ..... 50.

LEARN & PLAY

Access Software

4655 World Class Leader Board Golf.... 25.

Accolade

1184 Hardball *(CP)* ..... 26.
4484 Mean 18 *(CP)* ..... 26.
4485 4th and Inches *(CP)* ..... 26.
6760 Test Drive II-The Duel *(CP)*..... 31.

Activision

4475 Quarterstaff *(CP)*..... 28.
4486 Manhole..... 28.
5127 Manhole *(CD-ROM)* ..... 34.
5517 Cosmic Osmo..... 40.

★Ars Nova ... 30 day MBG

1215 Practica Musica 2.2 ..... 69.

★Bogas Productions ... 60 day MBG

4255 Super Studio Session 2.0 ..... 65.
6135 Super Studio Session & Complete Music Library ..... 99.

Bright Star Technology

3961 Talking Tiles 1.0 ..... 26.
1402 Alphabet Blocks 1.0 ..... 30.

Broderbund Software

4314 Type! 1.0..... 18.
5886 Star Wars *(CP)* ..... $23.
4099 Shufflepuck Cafe *(CP)*..... 23.
1421 Ancient Art of War *(CP)* ..... 26.
4540 Ancient Art of War at Sea *(CP)*..... 26.
6516 The Playroom *(CP)* ..... 29.
4229 Where/World Carmen Sandiego? *(CP)* 29.
5755 Where/Europe Carmen Sandiego?*(CP)* 29.
5233 Where/USA Carmen Sandiego? *(CP)* 29.
6384 PlayMaker Football *(CP)* ..... 29.
4966 SimCity 1.1 *(CP)* ..... 29.
5871 SimCity Supreme ..... 47.
6515 SimCity Terrain Editor ..... 16.
1422 Geometry 1.2 *(CP)* ..... 58.
4067 Calculus 1.2 *(CP)* ..... 58.
1426 Physics 1.2 *(CP)*..... 58.

★Bull City Software ... 30 day MBG

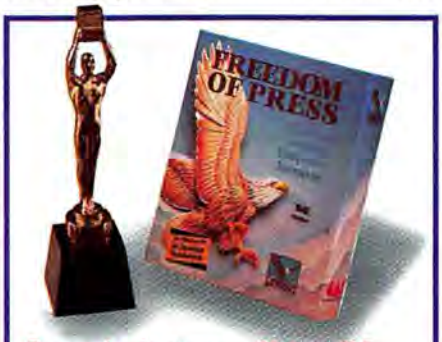
5841 Moriarty's Revenge *(CP)*..... 32.

Bullseye

1545 Fokker Triplane 2.02 *(CP)* ..... 23.
1544 Ferrari Grand Prix *(CP)* ..... 31.
4074 P51 Mustang Flight Simulator *(CP)* . 31.

Carina Software

5726 Voyager 1.2 ..... 89.



Custom Applications ... 30 day MBG

6517 *Freedom of Press 2.1A*–1989 MacUser Editors' Choice Awards for *Software Product of the Year* and *Best Graphics/Publishing Utility*. Brings PostScript-printing capabilities to non-PostScript output devices..... $255.

★Casady & Greene ... 60 day MBG

2268 Crystal Quest 2.2X ..... 25.
4119 Crystal Quest w/Critter Editor 2.2X . 39.

Coda Music Systems

5854 MusicProse 1.01..... 187.
5604 Finale 2.0..... 559.

Davidson & Associates

1734 Math Blaster! 1.0 *(CP)*..... 29.
6128 Math Blaster Mystery *(CP)*..... 29.
4978 Speed Reader II 1.0 *(CP)* ..... 29.

★Electronic Arts ... 30 day MBG

6716 Pipe Dreams..... 17.
1850 Reach for the Stars 3.0 ..... 26.
6297 Halls of Montezuma ..... 26.
6663 Sands of Fire ..... 32.
5554 Bard's Tale ..... 32.
4064 Chuck Yeager Flight Simulator .... 32.
4981 Starfleet 1 ..... 36.
6594 Starflight..... 39.
1846 Deluxe Music Construction Set 2.5 . 84.

★First Byte ... 30 day MBG

5294 Puzzle Storybook 1.0 *(ages 3-8)* ... 27.
5293 Dinosaur Discovery Kit 1.0 *(ages 3-8)*. 27.
3941 Smooth Talker 3.0 ..... 32.
3936 KidTalk 2.0 *(ages 5-15)* ..... 32.

★Great Wave ... 30 day MBG

2276 KidsTime 1.2 *(ages 3-8)* ..... $26.
5642 KidsMath 1.1 *(ages 3-8)* ..... 26.
4334 NumberMaze 1.1 *(ages 5-12)* ..... 26.
2270 American Discovery 2.3 *(ages 9 +)*. 26.
2273 ConcertWare + 4.0..... 38.
2271 ConcertWare + MIDI 5.1..... 98.

★HyperGlot ... 30 day MBG

Word Torture - Beginner to Advanced *(Span., Fren., Germ., Ital. & Rus.)* ea. 29.
Pronunciation Tutor - Beginner *(Spanish, French, German)* ... ea. 35.
Verb Tutor - Intermediate *(Spanish, French, German)* ... ea. 42.
6604 Verbal Aspect - Inter. *(Russian)* ..... 42.
6611 Kanjimaster - Beg. *(Japanese)*.... 105.

★Inline Design ... 30 day MBG

5870 Bomber 1.3 *(includes headphones)* 26.

★Knowledge Revolution ... 90 day MBG

7310 Interactive Physics ..... 169.

★Learning Company ... 30 day MBG

2670 Reader Rabbit 2.2 *(CP) (ages 4-7)*.. 30.
5453 Talking Math Rabbit 1.0 *(ages 4-7)* . 30.

MicroProse

4697 Pirates! *(CP)* ..... 35.

★Microsoft ... 30 day MBG

2868 Flight Simulator *(CP)*..... 32.

Miles Computing

5253 The Puzzle Gallery ..... 26.
2765 Fool's Errand ..... 32.
2767 Harrier Strike Mission II *(CP)* ..... 32.

Mindscape

4083 Balance of Power 1990 *(CP)* ..... 29.
3987 Colony *(CP)* ..... 29.
4596 Deja Vu II *(CP)* ..... 29.
2743 Crossword Magic *(CP)* ..... 29.
2749 Shadowgate *(CP)* ..... 29.
2751 Uninvited *(CP)* ..... 29.

★Penton Overseas ... 30 day MBG

5864 VocabuLearn/ce French *(level I)* ... 29.
5887 VocabuLearn/ce French *(level II)*... 29.
5865 VocabuLearn/ce Italian *(level I)* .... 29.
5889 VocabuLearn/ce Italian *(level II)*.... 29.
5867 VocabuLearn/ce Spanish *(level I)* .. 29.
5891 VocabuLearn/ce Spanish *(level II)*.. 29.
5868 VocabuLearn/ce German *(level I)* .. 29.
5888 VocabuLearn/ce German *(level II)*.. 29.
6639 VocabuLearn/ce Russian *(level I)*... 29.



Microsoft ... 30 day MBG

Mail 2.0–Allows you to send & receive messages and files, & share the job of creating information within a small workgroup or a large network.
5858 *Microsoft Mail 2.0 Workstation*..... $83.
5856 *Microsoft Mail 2.0 Server*..... 245.

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Franklin Software ... 30 day MBG

7070 *Language Master 2.0*–Provides definitions for 80,000 words plus the largest thesaurus available with 1.4 million responses. Add this DA to all of your Mac applications..... **$59.**

6640 VocabuLearn/ce Russian *(level II)* . . 29.
6638 VocabuLearn/ce Hebrew *(level I)*. . . 29.
5866 VocabuLearn/ce Japanese *(level I)* . 35.
5864 VocabuLearn/ce Japanese *(level II)*. 35.

★Personal Training Sys. ... 60 day MBG

MacConnection carries the entire line of PTS modules. A partial listing follows.

Personal Training for Excel 2.2
5573 XL1 Beginning Spreadsheets..... 36.
5574 XL2 Intermediate Spreadsheets . . . 36.
5575 XL3 Advanced Spreadsheets..... 36.
5576 XL4 Creating Business Graphics. . . 36.
6021 XL5 Building Databases..... 36.
6020 XL6 Beginning Macros..... 36.
6367 XL7 Advanced Macros..... 36.

Personal Training for Macintosh
5263 B1 The Basics *(for 2 floppy drives)*. . 36.
5264 B2 The Basics *(for Plus or SE w/HD)* 36.
5265 B3 The Basics *(for Mac II w/HD)* . . . 36.
5266 B4 Beyond the Basics..... 36.

Personal Training for Word
4947 W1 Beginning Level..... 36.
4854 W2 Intermediate Level..... 36.
5098 W3 Advanced Level..... 36.
5418 W4 Additional Features..... 36.

Personal Training for Persuasion
5269 LP1 Beginning Persuasion..... 36.
5270 LP2 Intermediate Persuasion..... 36.
5271 LP3 Creating Auto Templates..... 36.
5272 LP4 Creating Artwork..... 36.

Personal Training for HyperCard
5194 H1 Using HyperCard..... 36.
5195 H2 Creating Cards & Stacks..... 36.
5267 H3 Basic Scripting..... 36.
5268 H4 Advanced Scripting..... 36.

Personal Training for PageMaker
4852 P1 Beginning PageMaker..... 36.
4853 P2 Intermediate PageMaker..... 36.
5096 P3 Tips & Techniques..... 36.
5097 P4 Advanced Features..... 36.

Personal Training for Works
5196 M1 Database & Form Letters .... $36.
5197 M2 Advanced Databases..... 36.
5273 M3 Spreadsheets..... 36.
5274 M4 Word Processing..... 36.

Personal Training for Illustrator 88
5259 A1 Beginning Illustrator..... 36.
5260 A2 Intermediate Illustrator..... 36.
5261 A3 Creating Special Effects..... 36.
5262 A4 Precision Drawing Techniques.. 36.

Personal Training for FileMaker
5278 FM1 Beginning FileMaker..... 36.
5279 FM2 Intermediate FileMaker..... 36.
5280 FM3 Advanced FileMaker..... 36.
5281 FM4 Tips & Techniques..... 36.

Personal Training for FreeHand
6353 FH1 Beginning Level..... 36.

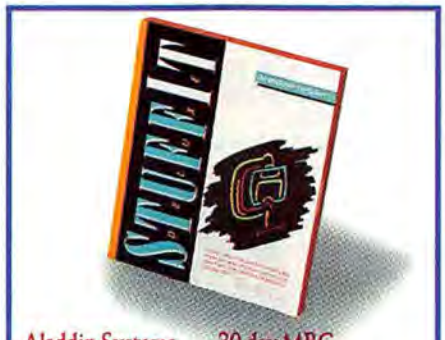
Postcraft
6466 Citadel..... 27.

Premier Technology
5773 Strategic Conquest Plus 2.0..... 34.
5774 NetTrek—The Real Version 2.3.... 34.

Sierra On-Line
3397 Leisure Suit Larry *(CP)*..... 23.
5694 Manhunter: San Francisco *(CP)*... 28.
5458 Manhunter: New York *(CP)*..... 28.
3394 King's Quest *(CP)*..... 28.
3396 King's Quest III *(CP)*..... 28.
3398 Police Quest *(CP)*..... 28.
3399 Space Quest *(CP)*..... 28.
3400 Space Quest II *(CP)*..... 28.

★Silicon Beach ... 60 day MBG
3501 Apache Strike 1.1..... 32.
3502 Beyond Dark Castle..... 32.
3503 Dark Castle 1.1..... 32.

★Softstream Int'l., Inc. ... 30 day MBG
4071 Mac•Man..... 23.
4995 Cribbage Tutor..... 26.
6258 MacRummy..... 32.
4073 Colour Billiards..... 38.



Aladdin Systems ... 30 day MBG

6740 *StuffIt Deluxe 1.0*–The new generation of the standard for compression, security, and archiving software has over 75 new features. Includes "Magic Menu" Finder extensions for working from Apple's Finder ..... **$63.**

★Software Toolworks ... 30 day MBG
4945 The Hunt for Red October 1.1.... $20.
1842 Chessmaster 2100 1.1..... 28.
4619 Mavis Beacon Typing 1.3 *(CP)*.... 32.
4588 Life & Death *(CP)*..... 32.
6111 Cribbage King-Gin King..... 39.

★Spectrum Holobyte ... 30 day MBG
4001 Solitaire Royale *(for Mac II & SE)*... 19.
3464 Tetris 1.1 *(for Mac II & SE)*..... 19.
6112 Welltris *(for Mac II & SE)*..... 19.
3462 PT-109..... 25.
3459 Falcon 2.2..... 30.



Preferred Publishers ... 30 day MBG

5751 *Exposure 1.03*–The only screen capture utility that offers full black and white and color paint editing of your screen. Captures virtually any image on all Macintoshes . **$52.**

★Spinnaker ... 30 day MBG
2328 Sargon IV *(CP)*..... 28.
2329 SAT Score Improvement 1.0 *(CP)*.. 57.

★SubLogic ... 60 day MBG
4698 Jet *(CP)*..... 31.

★Think Educational ... 60 day MBG
3615 MacEdge II 1.0 *(CP) (ages 6-12)*... 27.

True BASIC, Inc.
3571 Algebra 3.02 *(with workbook)*..... 45.
3580 Pre-Calculus 3.02 *(with workbook)* . 45.
3575 Calculus 3.02 *(with workbook)*.... 45.
6110 Algebraic Proposer 2.0..... 45.

★Unicorn ... 30 day MBG
3751 Animal Kingdom *(CP) (ages 6-12)*.. 27.
3756 Math Wizard *(CP) (ages 5-10)*..... 27.

★Wayzata Tech. ... 60 day MBG
6369 The World Factbook 1989 *(CD-ROM)* 69.

★XOR ... 30 day MBG
6152 TaskMaker *(CP)*..... 27.
6038 Road Racer *(CP)*..... 38.
6040 MacGolf Classic *(CP)*..... 52.
3815 NFL Challenge 1.2 *(CP)*..... 55.

NETWORKS & COMMUNICATIONS

★Abaton ... 30 day MBG
4589 InterFAX 12/48 Modem..... 265.
6266 InterFAX 24/96 Modem..... 419.

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★CE Software ... 60 day MBG
5638 In/Out *(10 user)* ..... $187.
5174 QuickMail 2.2 *(5 user)* ..... 215.
5173 QuickMail 2.2 *(10 user)* ..... 315.
★CompuServe ... 60 day MBG
1676 CompuServe Information Service .. 23.
1673 CompuServe Navigator 3.0 ..... 49.
1674 Standard Service/Navigator Bundle 69.
Connect, Inc.
5834 Connect 1.5 for the Macintosh .... 63.
★DataViz ... 60 day MBG
1823 MacLink Plus/PC 4.5 ..... 119.
4842 MacLink Plus/Translators 4.5 ..... 99.
★Dove Computer ... 60 day MBG
6758 DoveFax Desktop ..... 279.
4939 FastNet III ..... 375.
4938 FastNet SE ..... 375.
5624 FastNet SE/30 ..... 375.
★Dow Jones ... 30 day MBG
5295 News/Retrieval Membership Package 24.
1785 Desktop Express 1.03 ..... 95.



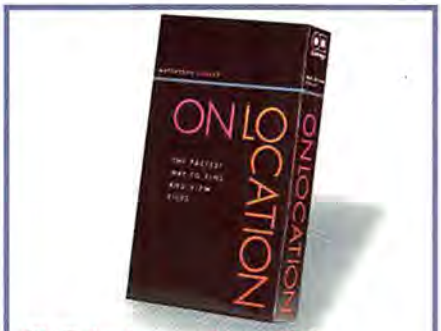
DeltaPoint ... 60 day MBG
6095 *DeltaGraph 1.5*–1989 MacUser Editors' Choice Award for *Best Presentation Product*. A charting package with the flexibility and power to create captivating charts and dramatic graphics, all in one program ..... $97.

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5707 Timbuktu 3.1 ..... 95.
4866 Timbuktu/Remote 1.0.1 ..... 123.
6371 Timbuktu/Remote Access Pack .. 849.
4867 Timbuktu 30-Pack 3.1 ..... 1285.
2201 TrafficWatch 1.08 ..... 125.
2202 PhoneNET to LocalTalk Adapter ..... 8.
5664 PhoneNET StarConnector ..... 17.
6273 PhoneNET StarConnector 10-Pack . 129.
2203 PhoneNET Connector *(DIN-8)* ..... 31.
4869 PhoneNET Connector 10-Pk *(DIN-8)* 198.
5251 PhoneNET CheckNET ..... 64.
4868 PhoneNET Repeater ..... 315.
2206 PhoneNET StarController 300 ..... 825.
6687 PhoneNET StarController-EN .... 1599.
5893 Portable Pack *(incl. two copies each of Timbuktu & Timbuktu Remote, two StarConnectors, and accessories)*. 329.
6778 Remote/Wakeup Cable ..... 33.
6766 MediaTracks ..... 189.
6767 MediaTracks Multimedia CD Pack . 319.
6768 MediaTracks Multimedia Pack .... 319.
★Freesoft ... 60 day MBG
6115 White Knight 11.6 ..... 85.
Hayes
2300 Smartcom II 3.1C ..... 84.
2307 Smartmodem 2400 ..... 349.



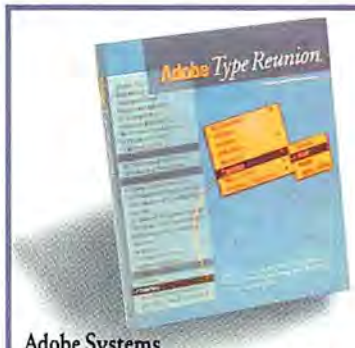
T/Maker ... 30 day MBG
7360 *WriteNow 2.2 Corporate 3-Pak*–Special limited time offer! Thru August 31st, 1990 get three copies of this two-time Eddy award winning word processor for over 55% off full retail. Compatible with Microsoft Word **$245.**

6654 V2400 Internal Modem w/software . call
6655 V2400 Baud Modem ..... 469.
5991 V9600 Baud Modem ..... 759.
Insignia Solutions
7058 SoftPC-AT/EGA Module ..... 125.
4089 SoftPC 1.3 ..... 245.
6688 SoftPC for the Mac Portable ..... 245.
Intel Corporation
5119 2400EX Modem ..... 179.
6265 2400EX with QuickLink II ..... 195.
6420 2400EX MNP Modem ..... 229.
6650 2400EX MNP with QuickLink II ... 249.
★Microsoft ... 30 day MBG
5858 Microsoft Mail 2.0 Workstation ..... 83.
5856 Microsoft Mail 2.0 Server ..... 245.
5857 Microsoft Mail 2.0 *(20 pack)* ..... 965.
★Nuvotech ... 60 day MBG
3000 TurboNet ST *(DIN-8)* ..... 30.
6751 TurboNet ST *(12-Pack)* ..... 279.
5277 TurboBridge ..... 319.
6272 NuvoLink SC *(\$25 rebate)* ..... 319.
6750 NuvoLink II *(\$25 rebate)* ..... 279.
6261 TurboStar ..... 1095.
Orchid Technology
6949 OrchidFAX Modem ..... 459.



ON Technology ... 1 year MBG
6385 *On Location 1.0*–This DA is the fastest way to find and view files. Find files by name or specific words they contain. Then view and copy text, including fonts and styles. Open, move, copy, rename, delete files ..... **$75.**

★Practical Peripherals ... 30 day MBG
3102 2400 Baud External Modem .... $179.
5285 PM 2400SA MNP Modem ..... 209.
3089 Mac Communications Pack 1.5 .. 225.
★Shiva ... 30 day MBG
3444 NetSerial X232 ..... 275.
4347 NetBridge ..... 339.
4942 TeleBridge ..... 339.
3443 NetModem V2400 ..... 435.
6917 NetModem V.32 ..... 1429.
6519 EtherGate ..... 1629.
★Software Ventures ... 30 day MBG
3455 MicroPhone II 3.0 ..... 215.
★Solutions, Inc. ... 60 day MBG
6721 MailMaker 5 User Pack ..... 117.
4308 BackFAX *(reqs. Apple FAX modem)*. 139.
6720 FAXGATE Plus ..... 239.
★Synergy ... 30 day MBG
6618 VersaTerm 4.1.1 ..... 88.
6619 VersaTerm-PRO 3.1.1 ..... 174.
★TOPS ... 30 day MBG
4188 TOPS Teleconnector *(DIN8)* ..... 25.
4598 TOPS FlashBox ..... 118.
3720 TOPS Flashcard ..... 155.
7057 MacPrint TOPS Network Version 1.0 165.
6264 TOPS Networking Bundle 3.0 .... 187.



Adobe Systems
6957 *Adobe Type Reunion 1.0*–Just place Adobe Type Reunion in your system folder and your typefaces are automatically alphabetized and conveniently sorted by family name and weight. Once and for all ..... **$39.**

★Traveling Software ... 60 day MBG
3729 LapLink Mac III Connectivity Pac.. 119.
6741 LapLink Mac III Network Pac..... 185.

INPUT/OUTPUT

★American Power ... 30 day MBG
5895 UPS 110SE ..... 209.
6686 UPS 370ci ..... 339.
Apple Computer
6717 MIDI Interface ..... 84.
6714 Apple Hi Res Color 13" Monitor .. 849.
6719 Apple Portrait Display ..... 899.
Brother International
6934 HL-8PS Laser Printer ..... 3299.
Caere
4476 OmniPage 2.1 ..... 539.
OmniSpell or OmniDraft ... *each* 69.
OmniTrace or OmniProof ... *each* 105.
★CoStar ... 30 day MBG
6090 LabelWriter ..... 185.
6067 LabelWriter Labels ..... 11.



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Under the Hood

Memory is the Mac's prime commodity — the currency of the computer. Here's what you need to know about managing it.

Programs need memory for their instruction store — the processor executes instructions from this in-RAM store — as well as memory in which to store data. Memory makes the Mac go round. You can't run a program without it.

The goings-on in memory ordinarily lie below the consciousness of application programmers. Usually we can ignore the details of low-level actions such as the allocation of automatics on the stack, but as certainly as death, taxes, and the ubiquitous bomb box, there comes a time when things go wrong, the source code is slow in revealing its secrets, and your only recourse is to dig in at the machine level. That's when you need an intimate knowledge of what's happening "under the hood." Knowing how your code and data look in RAM at run time is the most important facet of the black art of debugging.

This month we'll take a look under the hood of a Mac application. We'll explore the stack and heap as they relate to C programming, keeping an eye out for the potential pitfalls of working with data objects.

Program Code in Memory

Under the hood, code consists of the lists of machine-language instructions, created by THINK C's compiler and built-in assembler and derived from your source code. An instruction is a binary word that instructs the machine to do something simple, such as load a value into a register, move data from one

Figure 1: Pushing and Popping

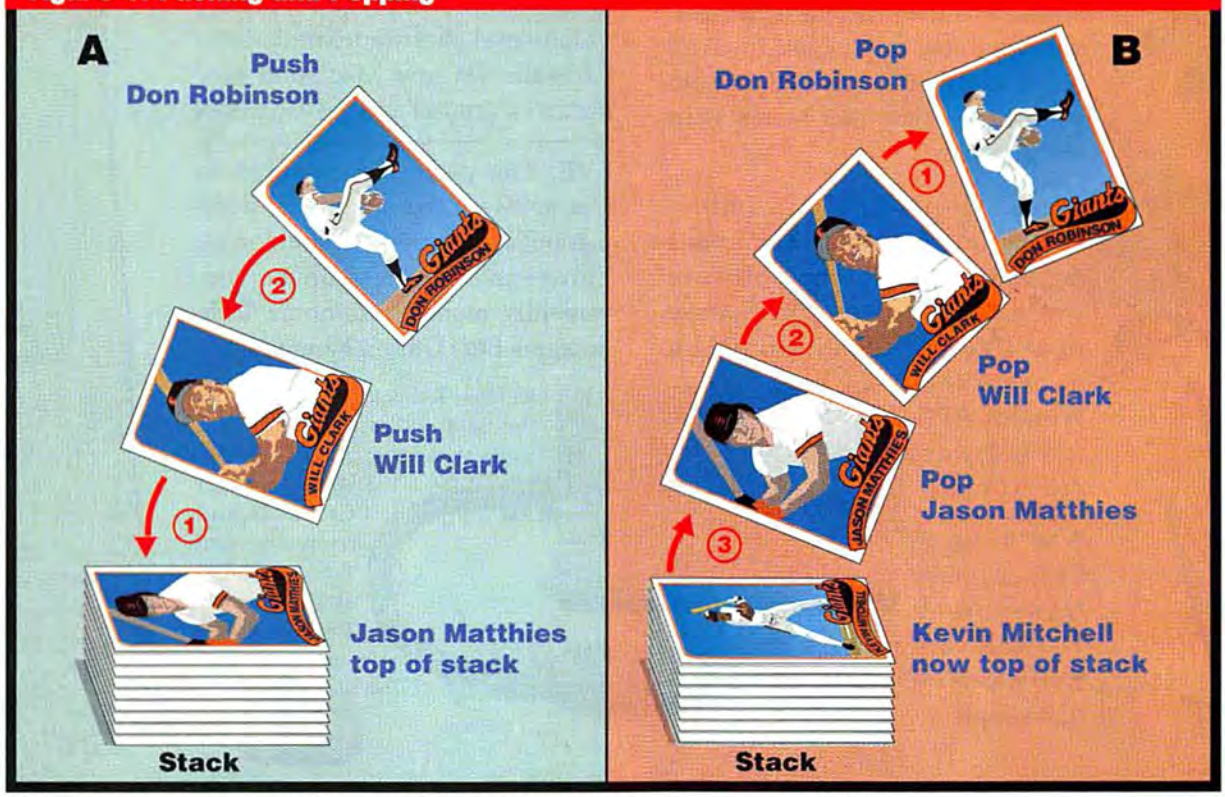


Figure 1: The stack grows as objects are pushed onto it (A) and shrinks as objects are popped off it (B).

By Kurt W. G. Matthies and Thom Hogan

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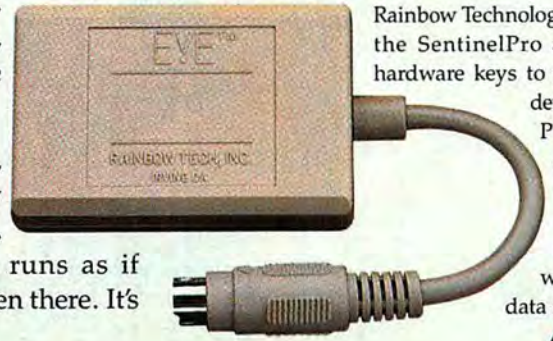
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memory location to another, or add the contents of two data objects.

We've known people who could read and edit machine code, poking bits here and there into RAM to fix a problem, but most people think of these instructions in terms of their mnemonics. The set of mnemonics for a processor is called its *assembly language*. Machine-level debuggers such as ICOM Simulations' TMON and Jasik Designs' Debugger contain a *disassembler* that converts the binary form of an instruction into its mnemonic. Using a debugger is the only practical way to view machine code.

Machine code is kept on-disk, as a part of your application file, in CODE resources, which are created by THINK C when it *links* the project. Each resource corresponds to a code segment that you define in the compiler's Project window.

Machine code must be in RAM while it is executing, and segments are limited to 32K, so it's necessary to segment a program. A Toolbox manager called the Segment Loader is responsible for automatically moving these segments from disk as they are needed. THINK C's Get Info menu selection reports the size of your code segments.

Large applications manage memory by controlling which code segments are in RAM at a given time. This is how a program with 600K of segmented code can run in a MultiFinder partition of 512K — some code segments are removed from RAM when others are moved in. The Toolbox call **`UnloadSeg`** marks a CODE resource as "purgeable," making it a likely candidate for being replaced when another resource is brought into RAM. Some applications call **`UnloadSeg`** on a set of program segments each time through the event loop. Another strategy is to call it before attempting to save a document. You may notice that Generic App, our sample application of the past three months, never calls **`UnloadSeg`**—small applications usually don't.

Program Data in Memory

The data of a running program is a dynamic collection of values associated with the program, kept in known locations of the computer's memory. The program reads and writes a location with its *address*, loading the contents of a 32-bit address register with this address and using an instruction to fetch or store the value. Memory is organized with its beginning at address 0 and the maximum possible address at 4,294,967,295, which corresponds to $2^{32} - 1$. Addresses are usually specified in hexadecimal, so the *address space* of a 32-bit machine is 0x00000000 through 0xFFFFFFFF; Apple uses only the lower 24 bits of an address, limiting the Mac's address space to 16 megabytes, although System 7 is slated to allow the use of all 32 bits.

The Mac's processors have eight 32-bit address registers, named A0 to A7, and eight 32-bit data registers, named D0 to D7. Address registers are used to do address calculations and to access values in RAM. Data registers are used as scratch space for arithmetic calculations. Register access is faster than RAM access, and clever use of **`register`** variables in your C program can dramatically speed up a sluggish application.

A data object or variable begins at its address and occupies zero or more of the bytes that follow. The number of bytes that a data object occupies depends on its type. If you're looking at data objects in RAM, there are no visible boundaries between consecutive variables. To know where one object ends and another begins, you need to know the sizes of these basic types. Table 1 lists these data types and their sizes in both C and Mac-based Pascal. You should know this material as well as you know your multiplication tables or the alphabet.

Table 1: C and Mac Data Types

C type	Mac (Pascal) type	Size (bytes)
`unsigned char`	`Byte`	1
`int`	`Integer`	2
`short`	`Integer`	2
`long`	`Longint`	4
`float`		4
`double`	`Extended`	10
`Size`	`Size`	4
`Fixed`	`Fixed`	4
`char *`	`Ptr`	4
`char **`	`Handle`	4
`char [256]`	`Str255`	256
`unsigned char`	`Boolean`†	1
`Boolean`§	`Integer`	2

†Pascal-language-defined (Toolbox)
§C-language-defined (application)

Scope of Variables

Some data objects are long-lived; others last only for as long as a function call.

Example 1

```
char *
foo (char * sourceStr)
{
    register char *p;
    char destStr [BUFSIZ];

    p = destStr;
    while (*p++ = *sourceStr++);

    return (destStr);
}
```

Example 2

```
char *
strcpy (char * destStr,
        char * sourceStr)
{
    register char *p;

    p = destStr;
    while (*p++ = *sourceStr++);

    return (destStr);
}
```

Example 3

```
printf ("%s",
    strcat (strcpy (aStr, "hello"),
    strcat (strcpy(bStr, ","),
    strcpy (cStr, "world"))));
```

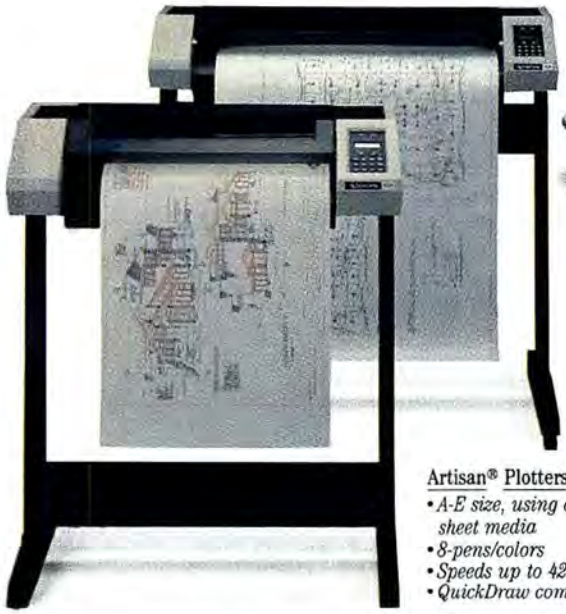
The *scope* of an object is the length of time it contains valid data. The scope of a global object is the entire program, since it is initialized when the program is loaded and space for it is reserved in the application heap until the program exits. On the other hand, variables declared inside a function — the local, or so-called automatic, variables — have a scope that is limited to the life of that function. Local variables are *not* initialized when they're created; their values are unknown, and you must initialize them before using them — not doing so is a common mistake of beginning programmers.

Another common programming error is using a variable outside its scope. For instance, **`foo()`**, in Example 1, copies a null-terminated string of characters (the string ends with a byte whose content is 0) and returns a pointer to the copy.

`foo()` has a serious flaw: The destination buffer is defined *inside* the function as a local variable. The function returns a pointer to a buffer that ceases to exist as soon as **`foo()`** returns. This function really needs to be passed a pointer to the destination buffer, declared in the caller. The fix appears in Example 2, and while we're at it, let's call **`foo()`** by its real name, **`strcpy()`**.

Notice that **`strcpy()`** returns a pointer to one of its arguments, so it

OK, Mac, draw!



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knows the address of this string. Why would a function return a pointer to a variable that was passed to it as a parameter? So that you can write one-line programs that look like LISP programs, as in Example 3.

The Stack

Automatic variables come into and go out of existence with a function because they're created on the application stack. A stack, sometimes called a push-down list, is known as a *LIFO* (last in, first out), an acronym that describes how it gives and receives data. The stack grows and shrinks as data objects are *pushed* onto and *popped* off the stack. Access to these objects is through the top of the stack. Figure 1 uses a stack of baseball cards to demonstrate the stack mechanism.

On the Mac, the top of the stack is maintained in register A7. The stack base starts in high memory and grows downward — thus register A7's value decreases as items are added to the stack.

In the normal sequence of a running program, one function calls another and that called function in turn calls another. This process proceeds according to the program's design. Programs use the stack to keep track of the flow.

A quick note on terminology: If function **foo()** calls function **bar()**, then **foo()** is the *caller* and **bar()** is the *callee*, or *called function*, as in Example 4.

Example 4

```
foo()
{
   ...
   bar (arg1, arg2);
   ...
```

The stack is used to store three kinds of data for each function call. To illustrate this, we'll use the **foo-bar** code fragment. Say that **bar()** is about to be called from **foo()**. Before **bar()** is called, **foo()** first saves the machine's current *state* on the stack. The state data includes all machine registers that **bar()** will use and the return address in **foo()** at which the instruction stream should continue when **bar()** returns.

Next, the values of the parameters **arg1** and **arg2** are pushed onto the stack. (C compilers push parameters in last-to-first order — **arg2** before **arg1** in our example — and Pascal compilers push their parameters first to last. There are also other differences in the calling conventions of the two languages. Look up *calling conventions* in the index of Symantec's *THINK C User's Manual* if you're interested.)

Finally, the space required for local variables of **bar()** is added to the top of the stack.

This collection of stack objects — the caller's state, the function's parameters, and the automatic variable space — is called the current *stack frame* and is pointed to by 680x0 register A6. All of a function's local variables are accessed as offsets from A6. The compiler generates the code responsible for creating the frame and, when the function returns, for updating both the stack and frame pointers. This is the reason why local variables have a scope limited to their owning function's lifetime — the stack frame in which they reside disappears after the function returns.

The Heap

Whereas the stack mechanism is rigidly structured and its contents are limited to function-call-related data, the heap contains a varied collection of data objects. The Mac actually has at least two *heap zones:* one for the system and the other for the application. The *system heap* is off-limits to your application. It contains the System code, fonts, DAs, INITs, device-management data, and other esoteric stuff important to the health of your Mac. The *application heap* is yours to use as needed, but step lightly: It contains your application resources, including the code segments of your application. Many a bomb box is the result of writing over a code resource in the heap. We'll refer to this application heap zone as "the heap," but remember that multiple heap zones can be resident in RAM and that the following discussion can apply to any one of them.

A heap consists of blocks — groups of contiguous memory locations — that are accessible to your program indirectly, through the Macintosh Memory Manager. They come in three flavors: *free*, *nonrelocatable*, and *relocatable*. You must *allocate* a block of memory from the heap before you can use it, a process analogous to renting a locker at the bus station — only one application can use a block at a given time.

Free blocks are those that aren't allocated. Most blocks in the heap fall into this category when an application begins. Free blocks are allocated with the Memory Manager procedures **NewHandle** or **NewPtr**, which accept a parameter that specifies the size of the block, in bytes. The calls **DisposPtr** and **DisposHandle** free an allocated block (Apple disposed of the *e* in *dispose*).

Nonrelocatable blocks are allocated in the heap, and their location never changes. You allocate one of these blocks with **NewPtr**, which returns a pointer to the block. Those of you familiar with the library function **malloc()** will recognize its similarity to **NewPtr**. Nonrelocatable blocks are undesirable, because of the Mac's memory-allocation method.

Relocatable blocks are preferable and are allocated with **NewHandle**, which returns a handle to the object. A handle is

ANSI Function Definitions

As a regular reader of this column, the first thing you might notice about our example **foo()** is the form of the function definition shown in Example A. Most of us old-timers would have defined this function as in Example B.

This new form comes from the 1989 ANSI (American National Standards Institute) standards on the C language. We'll be using this form from now on, not only because it's easier to type but also because it provides a mechanism for type-checking the arguments to a function (although THINK C users have been using function prototypes to do this for years) and because it will maintain compatibility with all other ANSI compilers.

You should note that this form is recognized *only* by THINK C version 4 (not by versions 2 and 3). From now on, we'll be using this form in our column and in the code on the on-line service. For a complete description of the ANSI standard, see Kernighan and Ritchie's *The C Programming Language*, second edition (Englewood Cliffs, New Jersey: Prentice-Hall, 1988).

Example A: New Form

```
foo (char * srcString)
{
      ...
}
```

Example B: Old Form

```
foo (srcString)
     char * srcString;
{
      ...
}
```

Example 5

```
typedef struct List
{
   short      count;
   ListElm    elm;
} List, *ListPtr, **ListHdl;


ListHandle    theList;
Size          listSize;

listSize = sizeof (List) +
   3 * sizeof (ListElm);

/* allocate a list of 4 elements */
if (theList = NewHandle (size))
   (**theList).count = 4;
else
   doMemError ();
```

Example 6

```
TEHandle    teh;
TEPtr       tep;

...
teh = TENew (&aRect, &aRect);
tep = *teh;

textHdl = NewHandle (120L);
tep->hText = textHdl;
tep->just = teJustLeft;
tep->selStart =
tep->selEnd = 0;
```

Example 7

```
(**teh).hText = textHdl;
(**teh).just = teJustLeft;
(**teh).selStart =
(**teh).selEnd = 0;
```

a pointer to a master pointer — that is, a **char **** data type in C. Relocatable blocks move around in the heap. Unlike with a sedentary nonrelocatable block, the data in a relocatable block is moved by the Memory Manager when the Mac is trying to create a large block of memory in the heap. This movement is called scrambling the heap.

When **NewHandle** is called, the Memory Manager collects runs of contiguous free blocks until it has one large enough to meet the request. Sometimes it needs to move relocatable objects out of the way to find the required space. The problem with nonrelocatable blocks is that they cause a logjam in the heap — the Memory Manager can't move them and has to restart its search for free blocks on the other side of this object.

Figure 2 illustrates this problem, called *heap fragmentation*, which limits a block's maximum size. The potential maximum size of a block is limited to the maximum size of a free-block run in the heap, which in a badly fragmented heap might be much less than the total available memory. Relocatable handles

> In a user-interface-intensive Mac application, allocations happen all the time without your knowledge.

avoid the problem, because the Memory Manager can move them out of the middle of long runs of free blocks.

Because your data is moved around in RAM, you need a method for keeping track of it. Apple's solution relies on a bank of system-maintained *master pointers* that hold the addresses of relocatable blocks. After the Memory Manager moves a block, it changes the value of the master pointer to point to the block's new location. The handle returned by **NewHandle** points at the master pointer, which never moves, and an application can find its data with a *double-dereference* of the handle.

Example 5 demonstrates this double-dereference: We've created a list structure of four **ListElm** elements. Note the double-dereference of the handle to assign the value 4 to the **count** member of the **List** structure. No matter where the block ends up in the heap, we can always get to the contents with a double-dereference.

In a user-interface-intensive Mac application, allocations happen all the time without your knowledge as a result of calls to the Toolbox. Displaying a dialog box is a good example. Your application may have called **GetNewDialog** and **ModalDialog**, but the various Toolbox Managers involved in creating, displaying, and tracking user events for the dialog box are calling **NewHandle** behind the scenes and the heap is being scrambled.

Another cause of block movement is an intersegment function call. We mentioned earlier that the Segment Loader makes sure that code is in RAM when it needs to be. The process of loading a CODE resource just might move relocatable objects in the heap, to make room for the new code segment.

Many bugs are due to this relocation of heap objects. One example occurs when your program calculates the address of an object, calls a function or Toolbox call that scrambles the heap, and then uses the no-longer-valid address.

Example 6 demonstrates such a loca-

Figure 2: The Heap Before and After Compaction

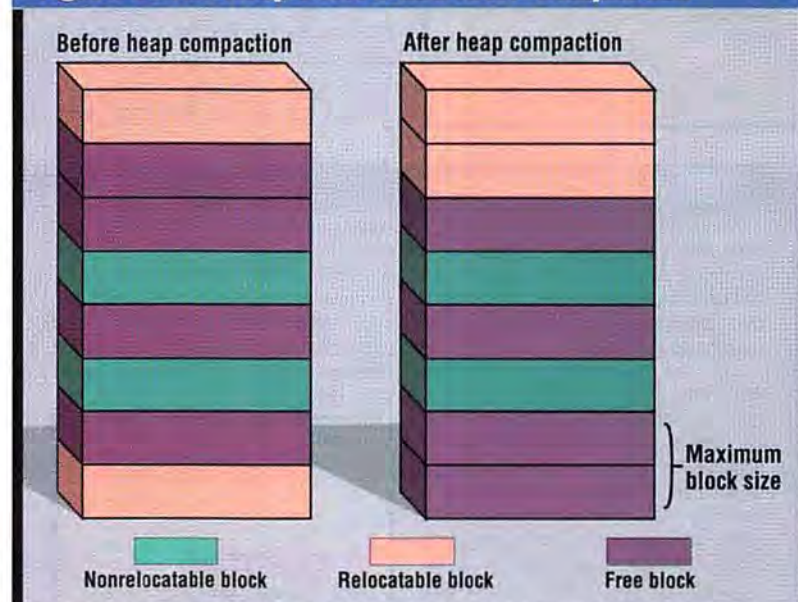
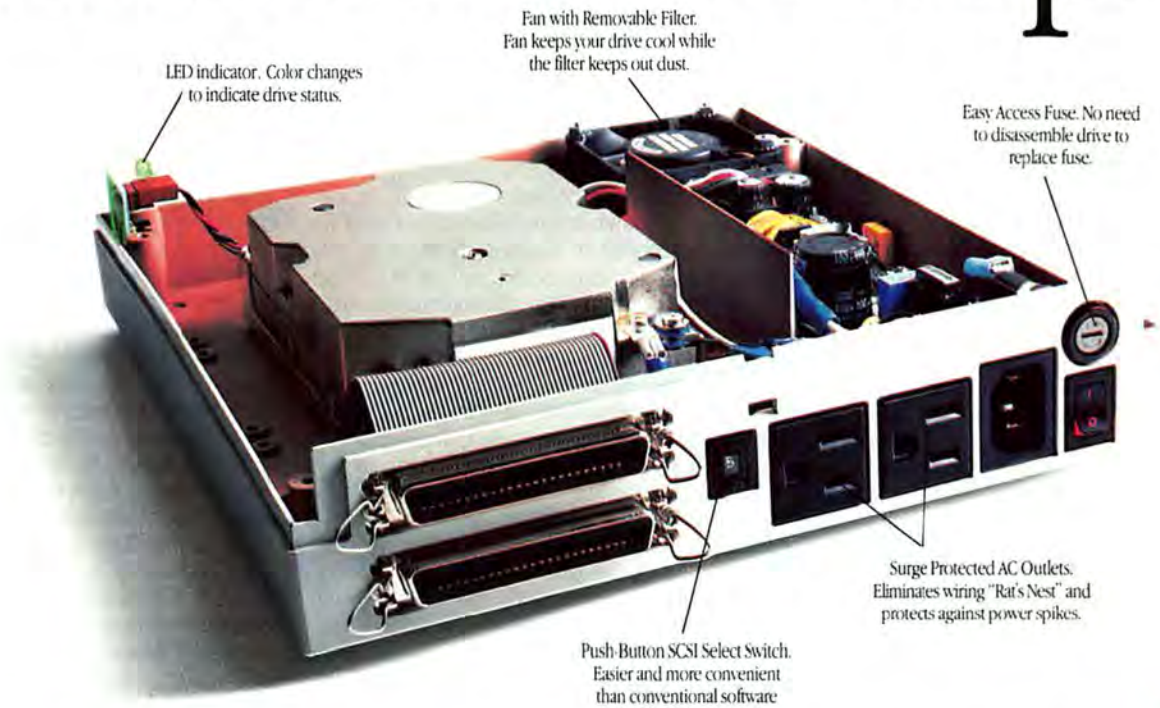


Figure 2: Here's how the heap looks before and after a compaction by the Memory Manager. Because of the nonrelocatable blocks in the heap, the maximum block size in this heap is limited to half the amount of free memory.

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tion mixup: The unwary programmer has put a copy of the dereferenced handle into a pointer variable. Next, he allocates a handle with **NewHandle** and then uses the pointer to assign the fields of **TERec**. Because the call to **NewHandle** moved the **teh** block, the pointer is no longer valid and the program is writing to an area in the heap where something vital may exist.

You can avoid such problems if you choose to always access the data in the relocatable object by double-dereferencing the handle, as in Example 7.

The first problem with this method is its inefficiency. You're calculating the address of the **TERec** object for each assignment. This string of initializations should be done with a pointer so that the address calculation happens only once — it's even better to use a register for the pointer. Just don't do anything to move objects in the heap in the interim.

Example 8 has the Power Programming Seal of Approval: Notice that all allocation is done before the handle is dereferenced and the pointer is used.

But even if you always double-dereference the handle, you can still get into trouble. Example 9 illustrates this premature-address-calculation problem: The address of **menuData** in the heap is pushed onto the stack, and then **GetIndString** scrambles the heap and the address becomes invalid.

> Check your code against a list of all the Toolbox calls that can potentially reorganize the heap.

At times it's necessary to do what we attempted in Example 6. How do you pass an address of a relocatable object when the object has the potential to move? The easiest solution is to *lock* the object in the heap with **HLock**, which has the effect of turning a relocatable object into a nonrelocatable one. Of course, doing so opens the door to heap fragmentation, so it's a good idea to first move the object from the center of things to the top of the heap with **MoveHHi** before you lock it. Example 10 demonstrates the process.

You can pass the address of a relocatable object to a Toolbox call that will move memory if you first lock the handle. Remember to unlock the handle with **HUnlock** as soon as possible.

Not all Toolbox calls move memory, and locking a handle is not always necessary. Certain Toolbox calls, such as **OffsetRect**, **SetPort**, **FixMul**, and **InfoScrap**, perform operations that really have no business moving relocatable objects in the heap, and locking handles when using these calls is a waste of time. Another class of Toolbox calls, such as **NewRgn**, **GrowWindow**, and **TESetText**, are used for indirectly creating objects in the heap, and when appropriate, handles should be locked.

Inside Macintosh lists all the Toolbox calls that can potentially reorganize the heap. They're listed as "Routines that may move or purge memory," which is not strictly accurate — memory doesn't really go anywhere, but the objects in the heap are relocated. This information is also available from other sources, such as Thom's *The Programmer's Apple Mac Sourcebook*. It's a good idea to check your code against these lists if you're going to do things with dereferenced pointers to relocatable heap objects.

Now that you know the circumstances under which the heap is scrambled, you don't need to lock a block every time you assign one of its fields. You probably won't be returning pointers to local variables anymore either. We hope you haven't misunderstood this month's message — we're not advocating assembly-language programming; rather, we're trying to make you a more effective C programmer.

Example 8

```
...
register TERec    *tep;
TEHandle          teh;

teh = TENew (&aRect, &aRect);
textHdl = NewHandle (120L);

tep = *teh;
tep->hText = textHdl;
tep->just = teJustLeft;
tep->selStart =
tep->selEnd = 0;
```

Example 9

```
MenuHandle    theMenu;

...
theMenu = GetMenu (kMenuID);
GetIndString ((*theMenu)->menuData,
   kMenuStrID, kMenuStr3);
...
```

Example 10

```
theMenu = GetMenu (kMenuID);

MoveHHi (theMenu);
HLock (theMenu);

GetIndString ((*theMenu)->
   menuData, ...

HUnlock (theMenu);
```

foo() under the Looking Glass

In Example 1, **foo()** (a typically obscure name for a generic function) has a simple job to do: When passed a pointer to a NULL-terminated character string, it copies the string and returns a pointer to the copy. To this end, **foo()** uses two local variables — **p**, a character pointer, and **destStr**, the destination buffer of **BUFSIZ** bytes. We've directed the compiler, through the use of the **register** keyword, to use one of the available 680x0 address registers for **p** and then assign the address of our buffer to it. Let's take a look at the assignment

```
p = destStr;
```

However, don't forget to initialize **n** or you'll end up pointing off into who-knows-where and come up with garbage.

This works because in C the name of the array without square brackets ([]) represents the address of the first character of the array. If you choose to ignore this shortcut, another way to get the address of the first character is with

```
p = &destStr [0];
```

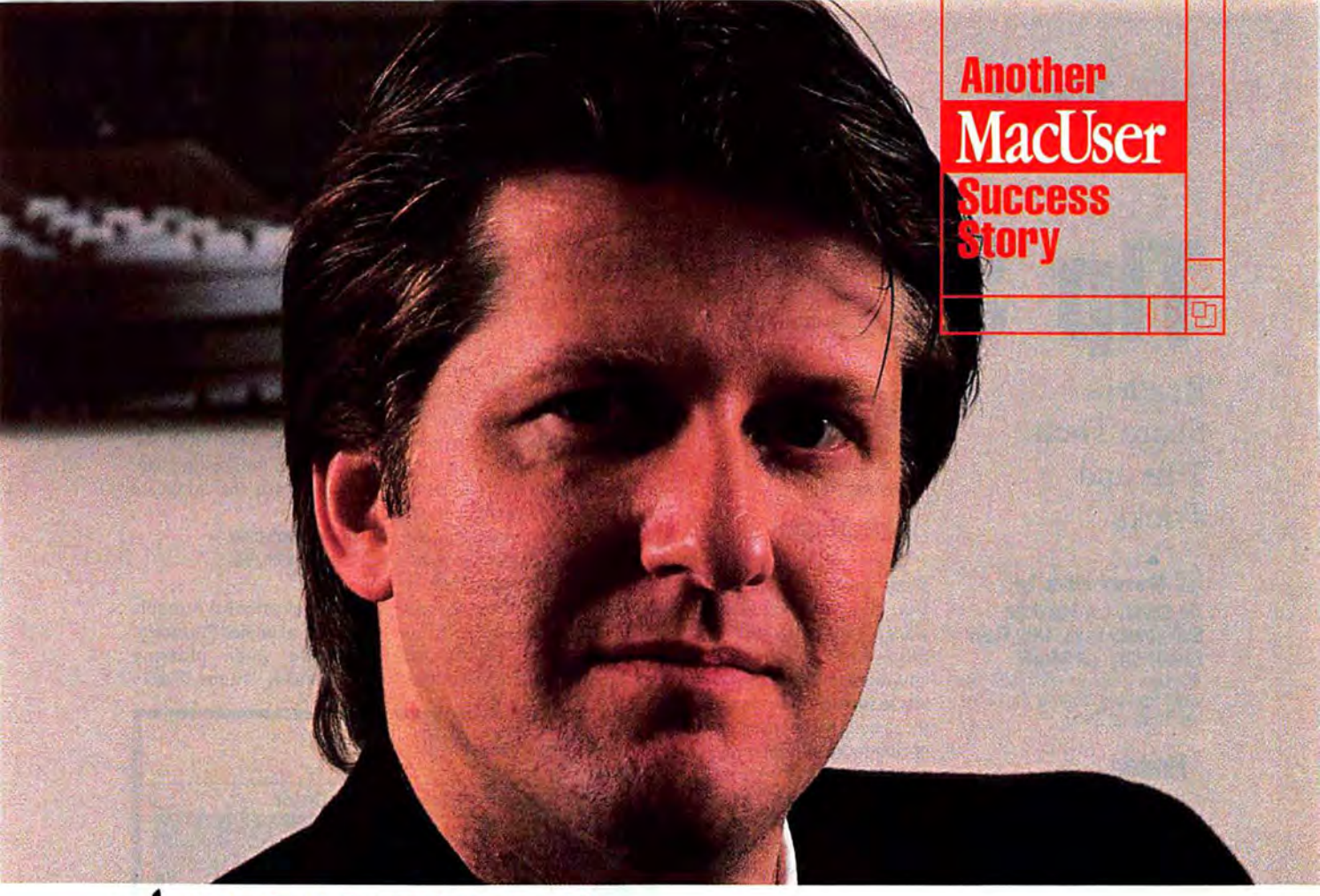
Using this form, you can point to the **n**th item in an array, as in

```
short n;
...
p = &destStr [n];
```

Don't forget to initialize **n**!

The copying occurs inside the **while** statement. When a null value (0L on the Mac) is assigned to the buffer, the test fails and the loop exits. The function completes by returning a pointer to the first character, again by using the name of the buffer without the square brackets.

The copying loop executes about four times faster than it would if we didn't use the register pointer. Note the use of pointer arithmetic to step through the two strings. This is the essence of tight C code: The **while** loop has no loop body, and the expression ***p++ = *sourceStr++** is commendably terse. This look fosters the rumor that C programmers sleep on cold cement slabs and wear hair shirts under their Woolrich flannels. It's just not true (ouch!).



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Mr. Marc Daniels, President, CDA Computer Sales

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Finder

If you're a neatnik like I am, it probably drives you crazy that the icons for frequently updated files such as Word's User Dictionary or White Knight's "stuff" file constantly move to the upper left corner of the window, often overlapping the icons already there. These icons do so regardless of their location when you started the application.

You can lessen the aggravation of these jumping icons by placing a cluster of them in the window's upper left corner. Hold down the Command key while you drag the icons into place, thus automatically aligning them to an invisible grid.

Once the icons are there, no room is left for the floating icon. It still moves as close as possible to the upper left corner, but at least it doesn't overlap the other icons.

David Valiulis
Scotts Valley, CA

If your Mac takes too long to copy a folder full of small files from a floppy disk to your hard disk, open the folder first, use the Select All command, and drag all the files to the hard disk. This technique cuts the copying time by up to 85 percent.

J. C. Steinhoff
Phoenix, AZ

MultiFinder

Users with 1-megabyte Macs rarely use MultiFinder. But they may occasionally want to test some small applications in the MultiFinder environment, and they generally assume this means setting the Special menu's Set Startup option to MultiFinder and restarting the Mac.

Having to restart this way is a nuisance and can be excruciatingly slow, especially if your System Folder contains many INITs.

Switching to MultiFinder temporarily (without altering the Set Startup option or restarting) requires the same procedure used when switching from one Finder to another. Hold down both the Command and the Option keys, and then double-click on the alternative Finder's (or MultiFinder's) icon. In this way, when you restart, you are in the Finder again. There's no need to utilize the Set Startup option, restart, and then restart again to get the Finder running solo.

José Carlos Cossio
Santander, Spain

Have you ever received the message "the file is busy" when trying to get information (Command-I) about an open file? This can be annoying, but there is a way to access the file without having to close the file or reboot (in case you're prying into some INITs).

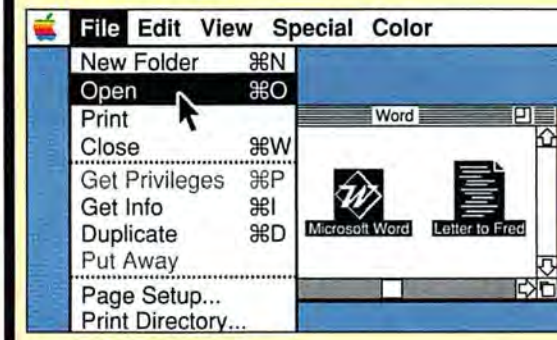
For example, suppose that while using an application, you have problems you suspect may be memory-related. You go to the Finder to check the memory size (with Command-I) and learn that this information is "n/a" (not available) because the application is open. Your only recourse is to save your work and quit the application in order to check it. Or suppose you want to check the version number of an application or an INIT/cdev such as MacroMaker that's always "busy." Quitting the application or relocating the INIT and then rebooting take some time.

There is an easier way of obtaining the information you want with minimal disruption — at least if you're running under MultiFinder. Simply duplicate the file (Command-D) you're interested in and then use Command-I to get the data you need from the copy. When you're finished, you can trash the duplicate file.

Steve Charnovitz
Falls Church, VA

You may often have trouble capturing a spooled PostScript print file when pressing Command-K (immediately

Tip of the Month



Finder

The problem of opening documents with applications that did not create them is as old as the Macintosh itself. Here's a simple solution:

1. Move the "foreign" document to the same folder that contains the application you want to use.

2. Click once on the application, Shift-click on the document, and choose Open (Command-O) from the File menu.

After that the application will launch, and if it supports the format of the "foreign" document, the document will be converted and displayed.

This technique works with a variety of common software combinations:

- Microsoft Word and text files created by other word-processing programs (such as the omnipresent MacWrite text files that are often encountered on online services).
- Studio/8 and files of type MPNT.

Fred C. Baker II
Wheat Ridge, CO

[*To automate the file-conversion process, also try HandOff II from SoftwareInnovations, P.O. Box 811, Allen, TX 75002; (214) 727-2329 — Ed.*]

Compiled by Gregory Wasson

PageMaker

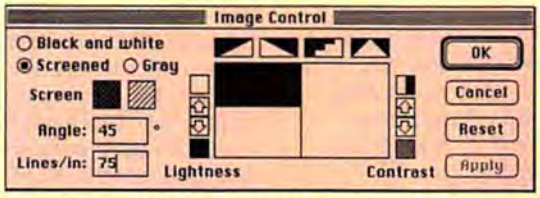


Figure 1: PageMaker's Image Control command on the Options menu lets you create gray shades with a finer texture than what is obtainable with PageMaker's built-in graphics tools, using a 300-dpi printer. This dialog box also controls linked TIFF gray-scale images such as photographs.

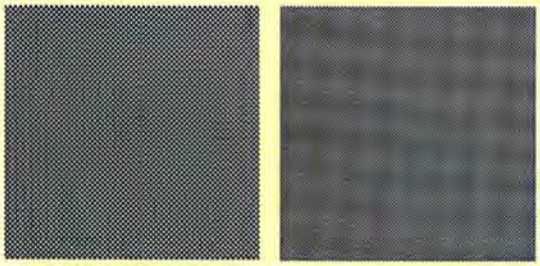


Figure 2: The gray screen on the left was created within PageMaker and defaults to 53 lpi on a 300-dpi printer. The imported MacPaint screen on the right was modified with the Image Control command to print at 75 lpi.

PAGEMAKER TIP

Use the following method to make a key-line trap for color around your PageMaker document:

On the master page, make a rectangle all the way around your page. Keep it 1/8-inch away from the outside — actually on the pasteboard. Give it a line weight of .5 point and a fill of "paper" (white). If other objects appear on the master page, send the rectangle to the back with Command-B. Note: This will not work unless you fill the rectangle.

Now when you print the page, the key-line will show up outside the live page area, but without obscuring the crop marks.

Sue Ann Sanders
Milwaukee, WI

Figure 3: You can create key-line color traps in PageMaker that print outside the live area of a page as shown here. The dotted lines define the edges of the page.

after pressing the OK button in the Print dialog box). Timing is often the problem: You have to press Command-K *immediately* after you select OK from the Print dialog box.

One of the most common reasons for the failure of this technique has nothing to do with speed or coordination, though. If you're in MultiFinder and Background Printing is on (set in the Chooser), you cannot create a PostScript file with Command-K. You must turn background printing off.

Judy Chavel Hochsztein
Bergenfield, NJ

PageMaker

The quality and texture, or fineness, of PageMaker's gray shades leaves something to be desired. The default 53-lpi (lines per inch) screen is much too coarse for most 300-dpi printers. Since you cannot change this 53-lpi setting for graphics created within PageMaker, most users have simply settled for second-rate output.

You can create custom gray boxes in Aldus FreeHand by using the Special command to specify a higher lpi in the halftone screen. You can also accomplish a similar effect by using the ubiquitous MacPaint and special controls available in PageMaker:

1. In MacPaint, create a black box the size you want.

2. Place the box into a PageMaker document, and while the box is still selected, use PageMaker's Image Control command (see Figure 1) to alter the lightness or contrast with the sliding scale. Change the halftone screen from 53 lpi to 66 or 75 lpi.

The result is a much tighter and finer dot pattern when you print the document on a 300-dpi printer (see Figure 2).

Bradley Schwartz
Saline, MI

When using PageMaker to set up a double-sided form, you don't have to set the starting page number to 1 and then flip between pages 1 and 2. Just set the starting page number in the Page Setup dialog box to 2 and create two facing pages.

This lets you work with both sides of the form on the screen at the same time (and the master pages correspond to the on-screen form).

Scott and Anne Butcher
Bischofsdhron
West Germany

[*You can later reset the Page Setup dialog box, of course. Remember also that most DTP programs offer automatic page-numbering tricks, which become useful when your documents start to grow. — Ed.*]

WriteNow 2.0

You might have problems when trying to open files with WriteNow 2.0 that were originally saved in the RTF (Rich Text Format) format by Word 4.0. Specifically, WriteNow displays the error message "Bad RTF number" and then refuses to translate the file.

WriteNow 2.0 has "filters" that are supposed to translate a RTF file to the WriteNow format. All RTF files start with the symbols `{/rtf` followed by a number.

For earlier versions of Word (Word 3.01, for example) the number was 0, so you see `{/rtf0.` However, Word 4.0 RTF files begin with `{rtf1`. Apparently, the WriteNow 2.0 translator checks this number, and if it is not what it expects, it refuses to translate the file.

The fix is easy: Open the RTF file in Word (you must make sure that you click on the Do Not Interpret button), and change the 1 to a 0; follow this procedure with a Save command. WriteNow 2.0 can then translate the file without difficulty.

Leonard Gordon
Bayside, NY

TIP SHEET

Excel

Expenses

	A	B	C	D
6	Date	Expense	Amount	Vendor
7	1/1/88	overhead	$1,000	A.B. Properties
8	1/5/88	overhead	$566	Ace Power & Light
9	1/5/88	overhead	$600	Wheelin's Gas Co.
10	1/5/88	overhead	$200	Ralph J Cook Garbage
11	1/5/88	overhead	$440	City of Franklin
12	1/6/88	inventory	$16,000	SW Wholesale
13	9/5/88	salary	$4,000	Andy Lubert
14	9/15/88	overhead	$5,000	AR Office
15	9/15/88	salary	$1,000	Mary Fuller
24				
25				
26				
27				
28				

Figure 4: Thick rules in Excel are a snap if you know how to cut rows down to size.

Word 4.0

When you're working with a table-laden document in Word, it can take forever to scroll through the table sections. If you frequently use tables in your work, here's a trick that can eliminate scroll crawl:

1. Select the entire table, and choose Copy as Picture from Commands in the Edit menu (and while you're at it, place this command on your Edit menu). Click on Do.

2. With the table still selected, perform a Paste (Command-V). The text table will be replaced by a graphic version of the same table. Now that the table has been changed to a graphic, you can scroll it much faster.

3. Go back to the Commands menu and choose Use Picture Placeholders (you can add this to the Edit menu as well). Click on Do.

Caution: If you ever expect to revise the table, you should first save a copy of the text version in a separate file. Once you have replaced a table with its graphic image, you can no longer edit it, with one exception: You can cut rows from the bottom up and columns from right to left if Show Paragraph (Command-Y) and Use Picture Placeholders are off. Just grab one of the handles on the graphic and drag to crop it.

Kiernan Burke
Boston, MA

Excel 2.2

Have you ever wondered how Microsoft does it in its ads — gets those nice thick rules in a spreadsheet (see Figure 4)? There's nothing in the manual about how to do this. You can't specify border thickness anywhere in the program.

Here's the trick:

1. Select just the cells around which you want thick rules. Don't select an entire row. Use the Border command on the Format menu to add top and bottom borders in those cells.

2. Now select the entire rows that contain the bordered cells by Shift-clicking on the row numbers or dragging through the numbers of the desired rows.

3. Select Row Height from the Format menu, and specify 1.

You can also make gray lines by not bordering the cells first. The result will look like gray bands on the screen but will not print out unless you decide to print all the worksheet's grid lines.

Robert B. Woodward
Atlanta, GA

SimCity

Here's a slick way to bring a SimCity village to metropolis status within five years — a maneuver that should delight even the most jaded politico.

Set the tax rate down to 0 percent (see Figure 5), starting with the January Budget Report that automatically flashes on the screen each year. Sims will flock to your apparently tax-free village.

Leave the tax rate at this setting until December rolls around. When it does, select Budget from the Windows menu (or press Command-B) and set the tax rate to the highest allowable level, which is 20 percent.

When the January Budget Report appears, you'll see a sudden influx of cash for your coffers. Now set the tax rate to 0 and wait until December — when you again set it back to 20 percent.

If you keep your eyes on the calendar, you will generate enough tax revenues this way so that you'll never have to embezzle funds again! And the Sims, who never seem to catch on to the devious ways of the mayor, just keep on moving in.

Kiup Kim
New Town, PA

[*If you think taxes aren't enough, try SimCity's giant reptile! — Ed.*]

SimCity

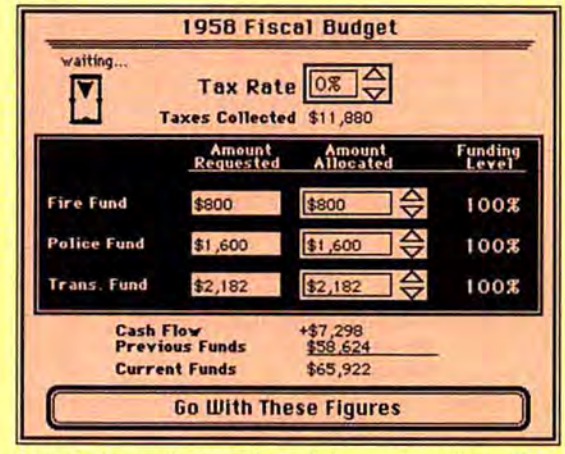


Figure 5: You can't escape taxes, but you can put them off — as proven by this trick for raising revenues while keeping the populace happy in SimCity. Your wealthy villagers will be without complaints, even when their tax rate suddenly jumps.



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Power User	319	NEW	359	NEW	399	NEW	459	NEW	499	NEW	659	NEW
PLI, Infinity Turbo	–	–	569	$20	619	**$26	–	–	–	–	999	$120
*Quantum Internal	–	–	–	–	399	$126	–	–	649	$220	–	–

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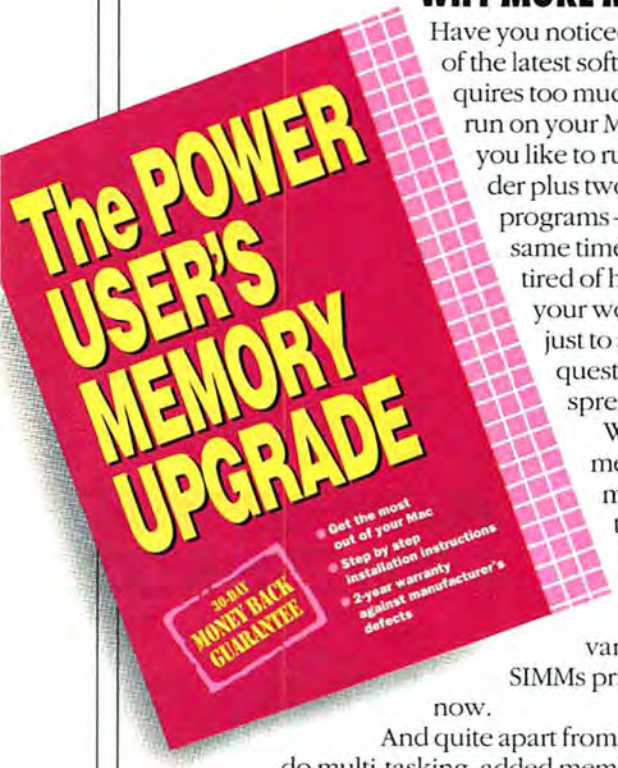
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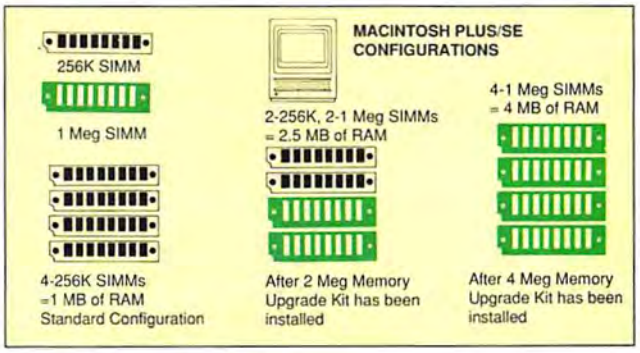
the process being done step-by-step. The video is free with the purchase of 2 or more SIMMs modules. ($29 if purchased separately.) The whole job should be completed in less than one hour. You'll need a simple tool kit, which is available for just $9.

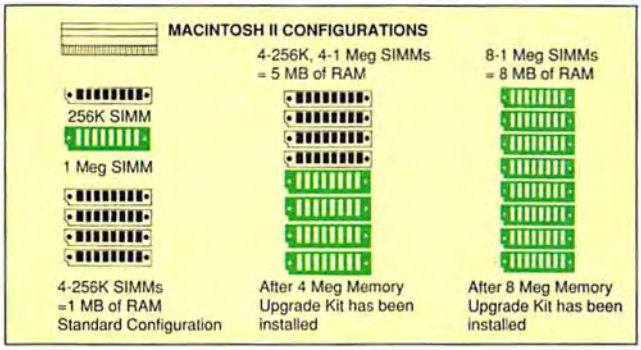
If you prefer, you can have a computer store install your SIMMs for you. Their service technicians have the necessary tools and expertise. The total cost shouldn't exceed $50.



The Mac Plus and Mac SE have four available slots on the motherboard, which originally contain four 256K SIMMs modules — totalling 1 megabyte (1MB) of memory. To upgrade, you can replace each 256K module with a 1MB module, but you must do this in pairs.

Replace two 256K modules and you will have a total of 2.5MB of memory. (That's the two new 1MB modules plus the original two 256K modules.) Replace all four modules and you'll have 4MB. (You should save the 256K modules for later use if you want to pass your Mac on to someone else.)





The Mac II, IIx, IIcx and SE/30 each come with a total of eight slots. The standard configuration has four 256K SIMMs modules, or a total of 1MB. Here, memory must be upgraded in multiples of four. This allows for expansion from 1MB to 4MB, 5MB or 8MB.

Remove the four 256K modules and replace with 1MB modules and you have 4MB. Leave the original modules and add four 1MB modules and you get 5MB. Removing the original modules and adding eight new 1 MB modules will bring you to 8MB of memory.

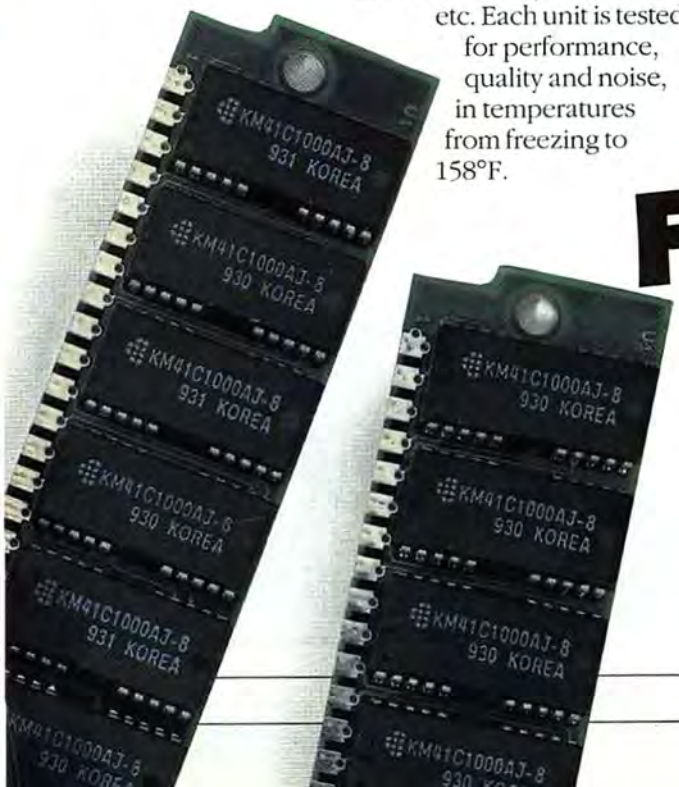
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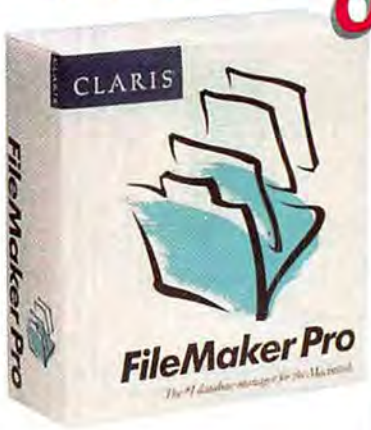
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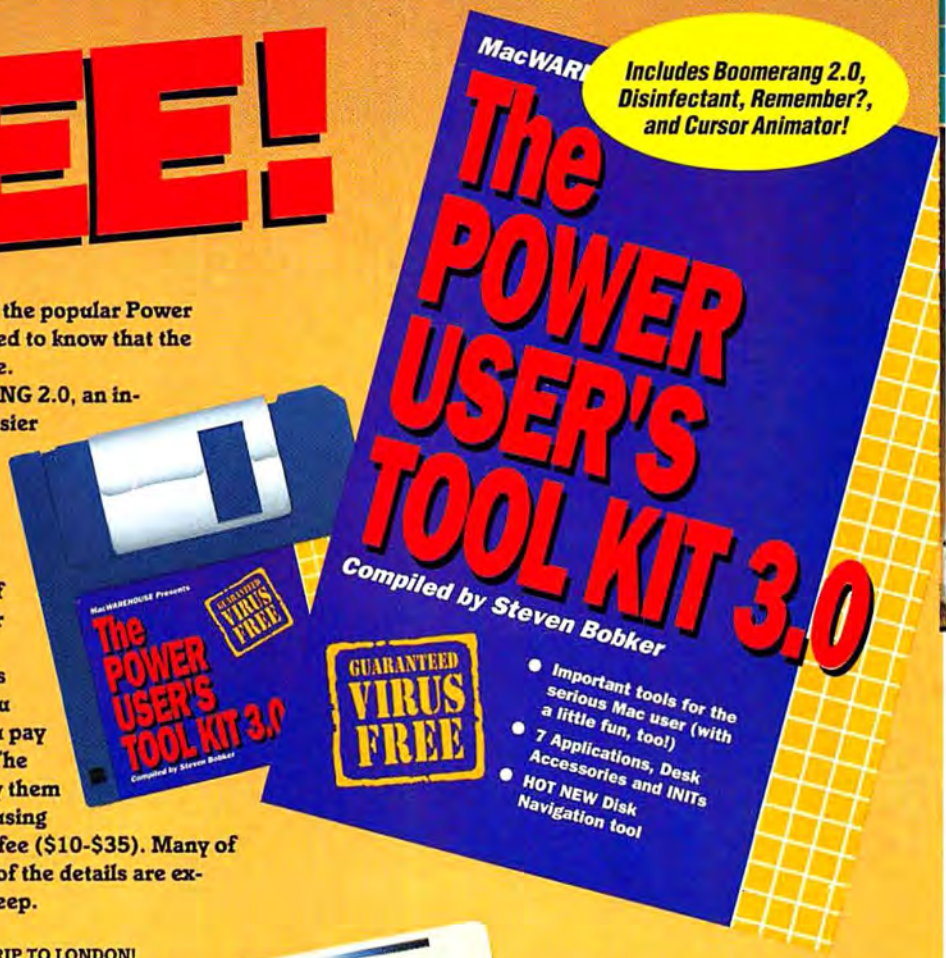


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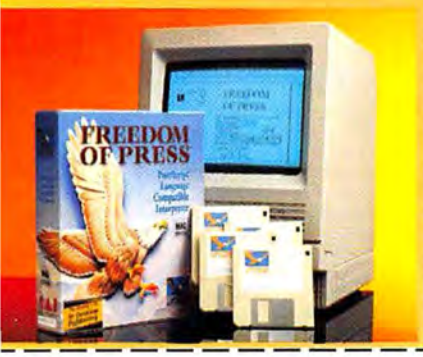


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Publish-It! Easy ..... 113.

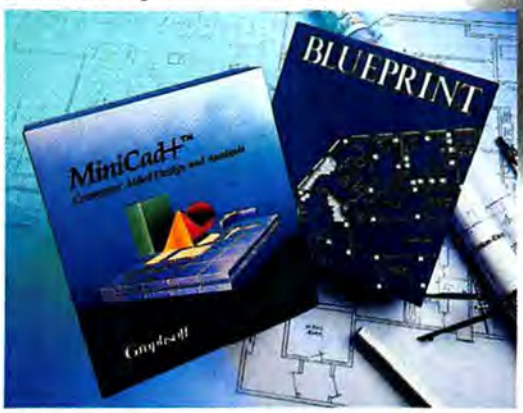
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Stick it to the chore of simple label printing in three easy steps! Import addresses, lists and graphics then use FastLabel's preformatted templates (or create your own) to produce everything from disk, V.C.R. and cassette labels to name badges, signs and more. (business) **$89**

FastEnvelope - This handy DA lets you import lists and graphics to print eye-catching envelopes, then adds postal bar codes saving you time and money on bulk mailings. (business) **$50**





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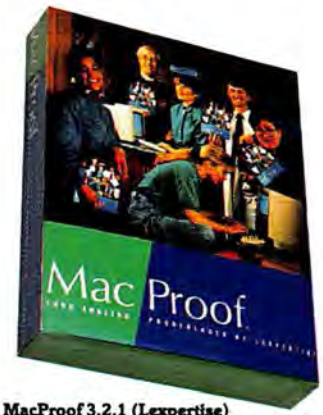
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Bridge 6.0 ..... 24.
Daily Double Horse Racing ..... 19.
Broderbund
Ancient Art of War At Sea ..... 27.
Shufflepuck Cafe ..... 24.
Where in Time is Carmen Sandiego? Call
Bull City Software
Moriarity's Revenge ..... 32.
Bullseye
Ferrari Grand Prix or P51 ..... ea 32.
Fokker Tri-plane ..... 24.
Centron Software, Inc.
BlackJack or CrapsMaster ..... ea 27.
BlackJack Strategy Tester ..... 65.
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CasinoMaster Deluxe Mac II version . 55.
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Informed Designer ..... 167.
Softstream International
Endeavour Planner ..... 95.
Symantec
More II 3.0 ..... 269.
Symmetry
KeyPlan ..... 275.
SYNEX
MacEnvelope 5.0 ..... 57.
MacEnvelope Plus ..... 159.
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PhoneNET connectors allow different devices such as computers, printers and file servers on an AppleTalk network to communicate with each other over ordinary telelphone cables. This system offers increased reliability, low maintenance, cost effectiveness, extended network distances and flexible network layouts. Fully compatible with LocalTalk cabling, FlashTalk and DaynaTalk. (networking) **$249.**



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Microcom Software
Carbon Copy Mac ..... 119.
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Prometheus
MAcKNOWLEDGE ..... 85.
Shiva
DOS Dial-In or CONNECT ..... ea. 69.
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Solutions
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TOPS
InBox Plus 3.0 ..... 649.
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TOPS DOS Network Bundle ..... 165.
Traveling Software
Lap-Link III Connectivity Pac ..... 119.
Lap-Link III Network Pac ..... 185.

DATABASE SOFTWARE

Acius
4th Dimension 2.0 ..... 469.
FileForce ..... 249.
AEC Management Systems
AEC Information Manager ..... 409.
Blyth
Omnis 5 ..... 429.
Claris
FileMaker II ..... 219.
FileMaker Pro ..... 219.
Fox Software
FoxBASE+/Mac ..... 292.
Odesta
Double Helix III ..... 389.
GeoQuery ..... 229.
ProVUE
Panorama ..... 257.

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Casady & Greene
QuickDEX ..... 31.
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Intersect CDR-35 ..... 419.
Qume
Crystal Print Publisher ..... 2900.
Seikosha America
Seikosha Printer (dot-matrix) ..... 235.
Sharp
The Wizard ..... 229.
ThunderWare
LightningScan 400 ..... 395.
ThunderScan Plus ..... 199.

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Bantam
Complete HyperCard Handbook ..... 22.

Beacon Technologies
HyperBible International Version ..... 175.
HyperBible King James Version ..... 145.
Bright Star Technology
HyperAnimator 1.5.1 ..... 98.
interFACE ..... 229.
DataDesk International
HyperDialer ..... 39.
ICOM Simulations
HyperTMON ..... 59.

MicroMaps
HyperAtlas ..... 59.
Silicon Beach
SuperCard 1.5 ..... 189.
Softstream International
HyperHit ..... 125.
Somak
Script Edit ..... 49.
Symmetry
HyperDA 1.2 ..... 45.
TimeWorks
HyperWorks Organizer ..... 57.

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Calcomp
WIZ Tablet ..... 159.
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Mach IV Plus Mouse/Joystick ..... 49.
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Mac 101 Keyboards ..... 129.
International versions ..... Call.
Forte Communications
Remote Mouse ..... 269.

Kensington
New Turbo Mouse ..... 109.
Keytronics
MacPro Keyboard ..... 118.
Kraft
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QuickStick ..... 39.
Trackball ..... 79.
LYNX
QuadLYNX Trackball ..... 59.
MicroSpeed
MacTrac ADB ..... NEW 75.
Micro Touch
The UnMouse ..... 189.
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Cordless Mouse ..... 95.
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Farallon Computing
MacRecorder (records sound) ..... 159.
Screen Recorder ..... 125.
Passport Designs
NoteWriter ..... 325.
Passport MIDI Interface ..... 89.
Primera Software
Different Drummer ..... 59.
Repertoire
Music Publisher ..... 359.
Resonate
Listen 2.0 ..... 62.
Tactic Software
Sound Clips Vol. 1 or 2 ..... ea. 49.

SPELLING/DICTIONARY THESAURUS CHECKERS

Deneba Software
BigThesaurus ..... 64.
Spelling Coach Pro 3.1 ..... 125.
Electronic Arts
Thunder II ..... 49.
Lexpertise
MacProof 3.2.1 ..... 115.
LifeTree
Correct Grammar ..... 49.
Microlytics
Word Finder 2.0 ..... 34.
Sensible Software
BookEnds or Sensible Grammar ..... 51.

STATISTICAL ANALYSIS

Abacus Concepts
StatView II ..... 279.
StatView SE+Graphics ..... 199.
SuperANOVA ..... 309.
Wolfram Research
Mathematica (SE) ..... 450.

UTILITIES

Abbott Systems
CanOpener 1.1 ..... 64.
Kent Marsh
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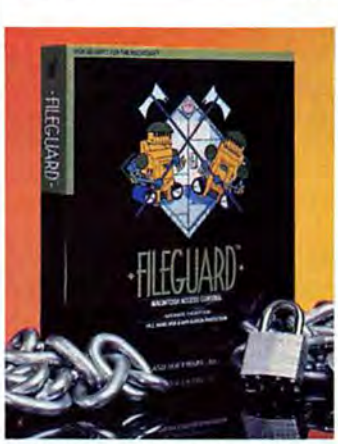
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StuffIt Deluxe ..... 63.
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Master Juggler ..... 64.
American Power Conversion
Power Chute ..... 67.
CE Software
DiskTop 4.0 or QuicKeys 1.2 ..... ea. 64.
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OmniPage ..... 545.
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Marco Polo Single ..... 155.
Marco Polo 5-pack ..... 519.
Microlytics
GOfer ..... 45.
OLDUVAI
ClipShare ..... 165.
MultiClip 2.0 ..... 69.
ON Technology
On Location ..... 75.
Peter Norton Utilities
Norton Utilities for the Mac ..... 75.
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Software Innovations
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POWERicons or POWERmenus ea. . 39.
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Help Folder

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✉ Write to
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Turn 'Em Off First

Q. Conventional wisdom has it that one should never connect or disconnect anything when the Mac is turned on. But isn't this a leftover from the early days, when cables had connectors that could temporarily make the "wrong" contact? It hardly seems possible that connecting or disconnecting a keyboard or a mouse while the Mac is turned on could cause any damage. Isn't unnecessarily turning the Mac on and off worse?

George Vogel
Newton, MA

A. No! *Never* connect or disconnect anything without first shutting down your Mac and all the peripherals. You may get away with it some of the time, but there's always a chance of damaging an internal component when you connect a peripheral without first powering everything down.

The ADB (Apple Desktop Bus — the connection for the mouse and keyboard on all Macintoshes from the SE on) is particularly sensitive. You should, without fail, turn off your Macintosh before plugging anything at all into the ADB.

Don't worry about turning your Macintosh on and off a few extra times. As I always say, an ounce of prevention is worth a pound of cure. And as long as I'm on my soapbox, don't forget to use the Shut Down command before you turn off the power.

The Word about Word Dictionaries

Q. In Papua, New Guinea, few people can answer my questions about Microsoft Word. Perhaps you'll be able to . . .

The most widely spoken language here is Tok Pisin (New Guinea Pidgin), which is written with roman letters. I would like to put together a dictionary that I could use to perform spelling checks on Tok Pisin documents created with Word 4.0.

Obviously, it would be preferable if I were able to check the documents in Word, but it appears that Word does not allow you to choose dictionaries. If this is not possible, is there a standalone spelling checker that has a Tok Pisin dictionary available?

Don Niles
Papua, New Guinea

A. Good news and bad news: The good news (according to Microsoft) is that there are indeed tools available for assembling a Tok Pisin dictionary. The bad news is that they are very expensive — about $25,000.

I was unable to uncover *any* product — spelling checker or otherwise — with a Tok Pisin dictionary. It appears that your only option is to create a Tok Pisin User Dictionary in Word 4.0. Good luck!

Microsoft Word Dictionaries, Part II

Q. I've been told that there is a German dictionary available for Word 4.0. Is this true? If so, where can I obtain it? Is there a French dictionary too?

David Lee
Los Angeles, CA

A. Microsoft recently announced the availability of

Shrinking PageMaker Files

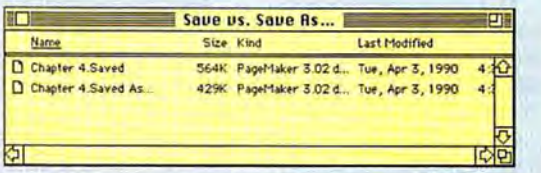


Figure 1: Save As shrinks PageMaker files considerably. In this case, using Save As instead of Save reduced the file by 135K.

Q. I've noticed that when I use the Save command on a PageMaker file several times, it takes up considerably more disk space than if I had used the Save As command and used a different filename. Why is this, and is it common to all programs? It gets troublesome when I'm trying to archive old projects on floppy disks.

Steven Smith
Stoughton, MA

A. You're absolutely right. Using Save As instead of Save can reduce the amount of disk space your PageMaker document occupies by a significant amount (see Figure 1). This is because when you do a Save, PageMaker retains a great deal of excess information, such as recently deleted text and graphics, to support its Mini-Save function.

According to C.J. Weigand's excellent book *Using PageMaker: Macintosh Version* (Cue Books, 1989), "Every time you add or delete pages, change Page Setup specifications, or turn to a new page of your publication, PageMaker does a mini-save. This mini-save produces a complete copy of your publication as the publication exists then. You can revert to the last mini-saved version of your file by choosing Revert from the File menu while pressing the Shift key. Using the Save As command deletes all excess data needed for mini-saving and shrinks the file to a fraction of its previous size."

This shrinkage is not common to all programs. Although some other programs will also shrink your file if you use the Save As command instead of Save, the amount of disk space saved is very rarely as dramatic as it is with PageMaker.

By Bob LeVitus

supplemental foreign-language, medical, and legal dictionaries for Word 4.0. The foreign languages currently available are French, German, Dutch, British (is British really considered a separate language?), Italian, Spanish, and Swedish. Each dictionary costs $75 plus $5.50 for shipping and handling. To order, call Editor's Choice at (800) 646-1116.

Windows: What a Dump

Q. I write software documentation and am currently documenting a PC program that runs in the Microsoft Windows environment. Do you know of a program that will capture Windows screens in a file that I can use on a Mac? I want to paste the pictures into Word.

Diana Rowden
Dallas, TX

A. I don't know a PC from an Amiga, but I knew where to go to find your answer — Computer Database Plus, available through CompuServe. (Log on and type `GO COMPLIB`). It contains citations and full-text articles from more than 130 magazines, newspapers, and journals, including *MacUser*, *BYTE*, and *PC Magazine*.

To find the product you described, I performed a keyword search for "screen and capture." Of the 14 articles the search turned up, one — entitled "Screen-Capture Programs Help Get It All Down on Paper" — stood out as a likely candidate. That article was described as an evaluation of four screen-capture programs, and it appeared in *PC Week*, November 27, 1989.

Not having that particular issue handy, I downloaded the full text of the article and discovered that the product you need is called Hotshot Graphics 1.5 ($249 from Symsoft; [415] 941-1552). It can capture screen images from Windows applications and save them in your choice of formats — TIFF, EPSF, PCX, or IMG. It also has a graphics editor that, according to the article, includes a "range of tools that rivals those in most paint packages."

Computer Database Plus costs $.40 per minute, plus $1 per abstract and/or $2.50 per abstract with full text. The search described here cost less than $10.

A Clean Screen

Q. I have a Mac IIcx with an AppleColor 13-inch monitor. For some reason, it seems to attract even more than its share of dust. I wipe the screen off, as per the manual's instructions, but within days another wonderfully disgusting coating reappears. Not only that, but so much dust has bonded to the monitor's case that it's currently an ugly grayish-black hue.

Never connect or disconnect anything before turning off your Mac and all the peripherals.

Could you suggest some way to remove this glop without damaging the tube or case finish? And is there any way to "demagnetize" the thing to keep the dust from building up again so quickly?

Aaron Dickey
New York, NY

A. I have an Apple color monitor too, and it's always attracting glop and goop. I hate it (the glop and goop, that is), so I use commercial monitor-cleaning wipes (available at good office-supply stores everywhere).

I've got two brands sitting on my shelf: Screenwipe and Liquid Paper. They clean your screen and reduce static buildup. Both work as promised — I use one or the other at least once a week.

To clean the case of the monitor and the computer itself, I use a commercial spray such as Formula 409 about once a month. Be sure you don't spray it directly onto the case; instead, spray a bit on a cloth. I've found that paper towels don't hold up well, so use real cloth. Be extremely careful not to get any cleanser on the monitor glass.

Finally, I cover my monitor when it's not in use. I use an old ski scarf. You can buy custom covers for most monitors, but my scarf was cheaper and works fine. (And it looks cool too!)

Replacing Styled Text in Word

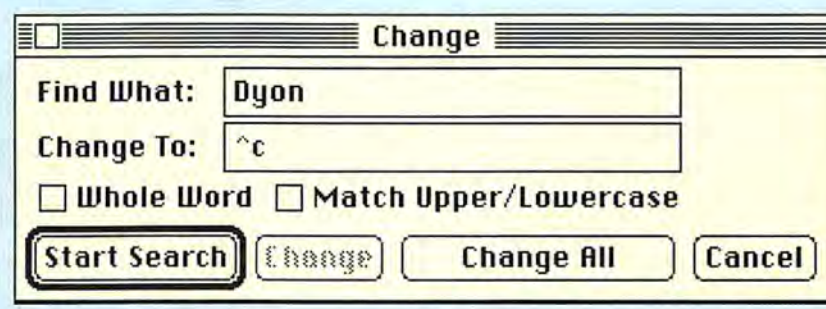


Figure 2: In Microsoft Word's Change dialog box, the ^c character lets you replace text with formatted text or graphics from the Clipboard.

Q. Here's a Word 4.0 question for you. Say you're working with the Change command in the Utilities menu because you've written the name of a boat as Dyon throughout your manuscript and now you want to go back and change it to Dyon or *Dyon*. Is there any way to do this?

The underline and italics settings from the Format menu don't work when the Change dialog box is open.

George Carey
Amherst, MA

A. Yes, it's easy to make that sort of change. Just type the word, apply any styles (such as italic or underline) to it, and then copy it to the Clipboard. Next open the Change dialog box and type Dyon in the Find What field and ^c in the Change To field (see Figure 2). This replaces occurrences of Dyon with the contents of the Clipboard.

Where There's a Will . . .

Q. I recently purchased the program WillMaker from Nolo Press. The program does not produce a text file. I have wasted hours trying to figure out how to get a text file of my will from this program so I can alter some of the wording and change its arrangement on the page, the font that it uses, and the quality of the printing (it prints out only in the Faster mode).

I called Nolo to ask about it, and they just told me to retype the whole will. If it were just for me, that might be OK, but I'd like to use this program with other members of my family. Any suggestions?

Steve Dutton
Harwood Heights, IL

A. According to the folks at Nolo Press, there's no way to extract a coherent version of your will from the saved file, using any of the current versions of WillMaker. If you try to use a program such as Can-Opener or 1st Aid Kit, you'll get only disjointed pieces of text in random order, so don't bother.

Nolo says that it designed the program this way to prevent users from making changes that might invalidate their will. That makes sense, but the company has had so many users ask for text export that it's included that feature in version 4.0, which should be available by the time you read this.

Registered users will get a card or letter with details for obtaining an upgrade. No price had been set at press time.

Get a Grip

Q. Here in earthquake country, we all know to bolt our bookshelves to the wall, but how can we keep our Macs on our desks? I'd hate to see my SE take a nosedive.

Pamela Gausman
Los Gatos, CA

A. You might find the answer to your needs in one of everybody's favorite space-technology spin-offs: Velcro. Velcro USA is manufacturing a superstrong fastener under the label Quake/Grip Desktop Fastening Systems. It might sound crazy, but it's actually a good way to keep your equipment from sliding around in the event of a quake.

A kit designed for classic Macs such as your SE has a suggested list price



of $15.95. For further information, call Velcro USA at (800) 950-3233 (in New Hampshire, it's [603] 669-4880).



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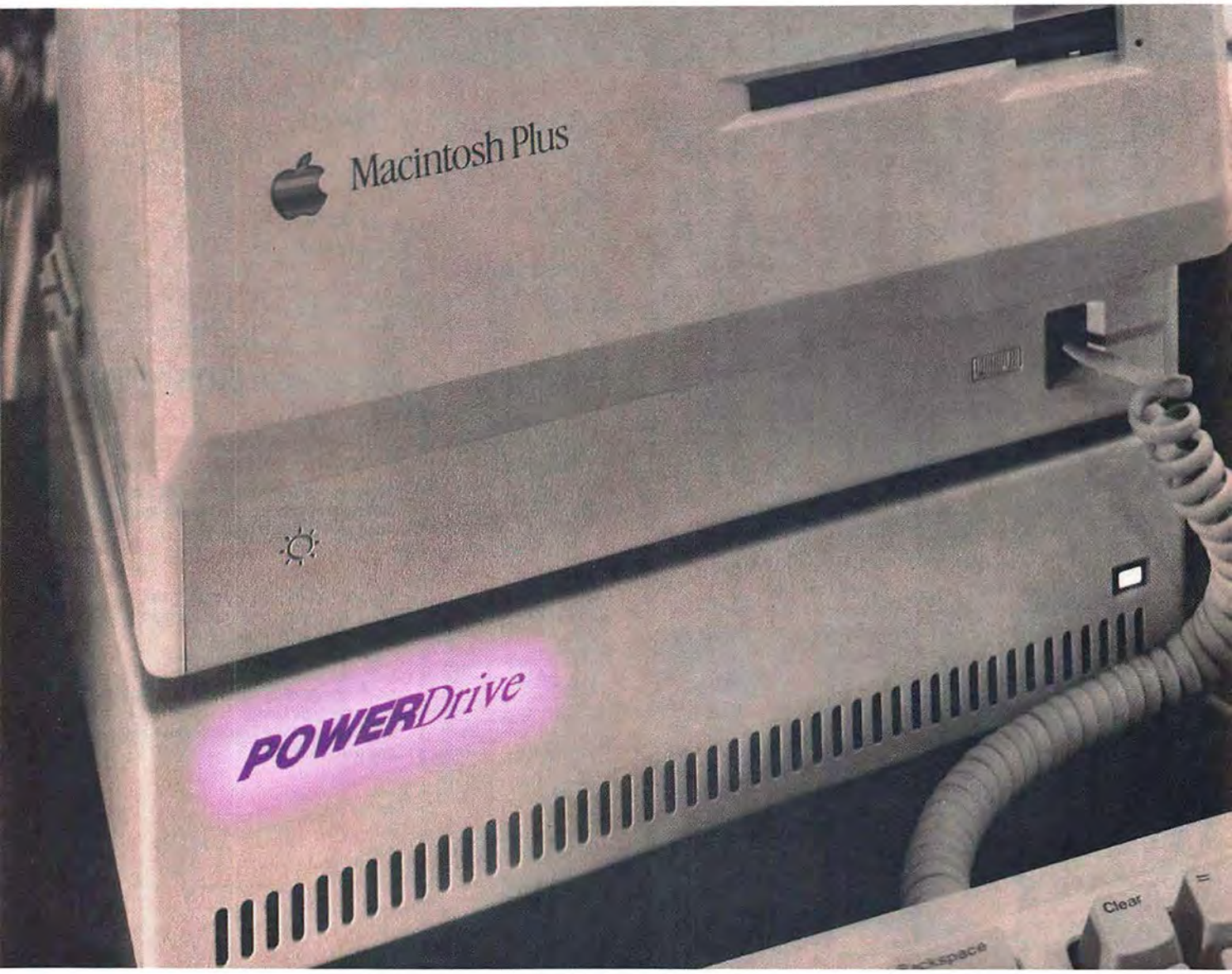
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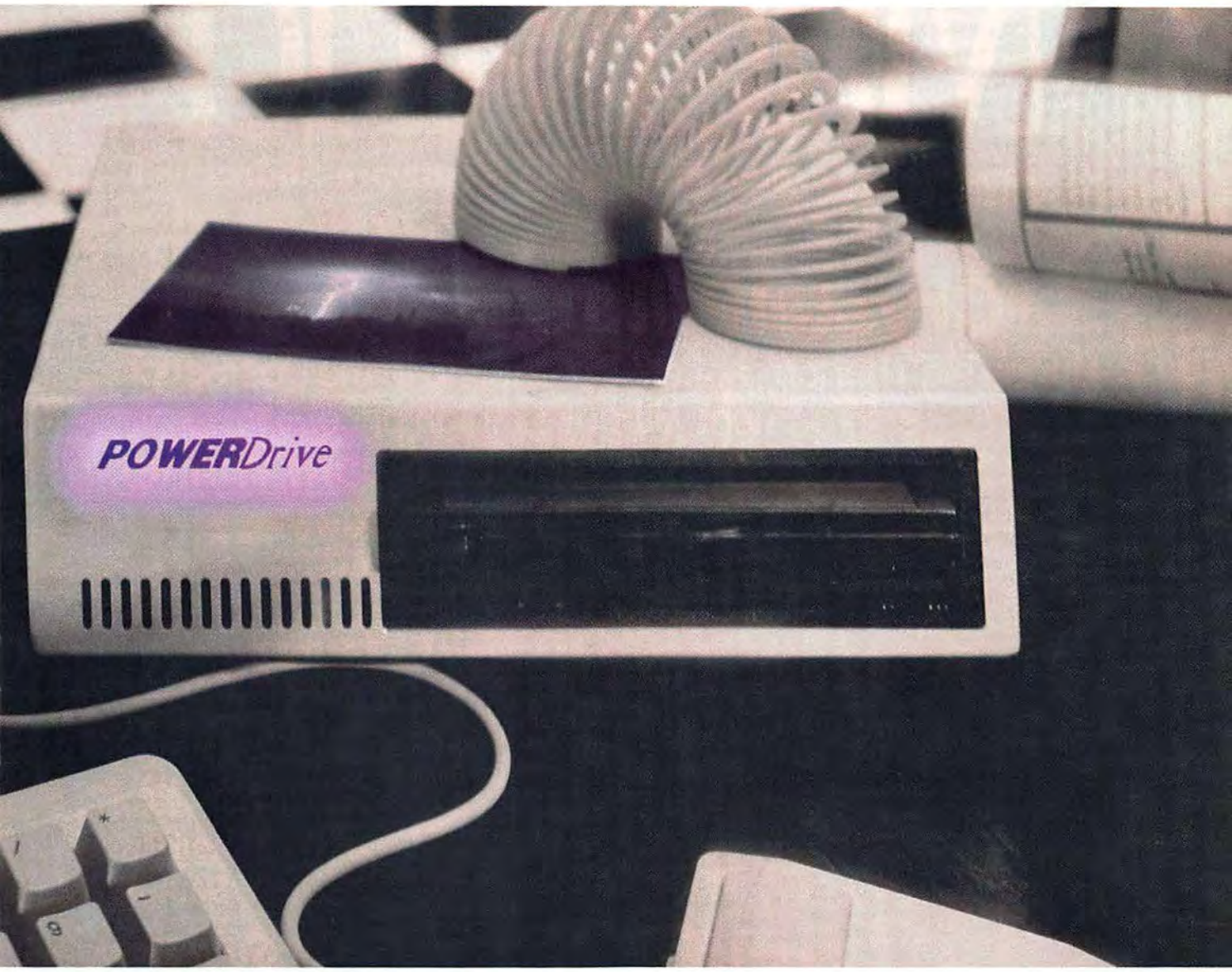
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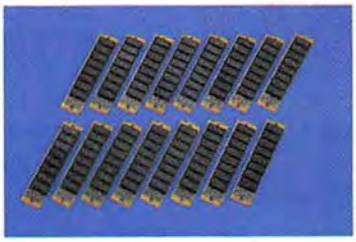
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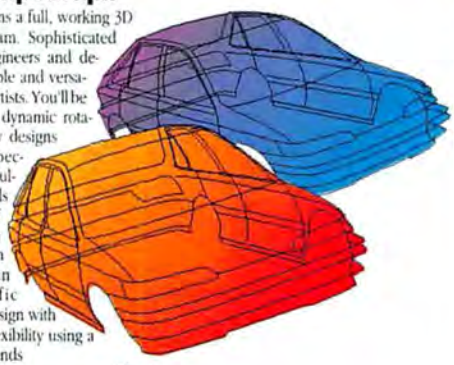
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Dove Marathon 030	445
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Micron Tech Xceed IIci Cache	575
Co-Processors	
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68881/82 16 MHz	99/199
68881/82 25 MHz	249/299
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Digitizers	
Audio Media	685
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Calcomp 18 x 24 Cursor/Pen	1689
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Farallon MacRecorder	159
Kurta IS/ADB Tablet 8.5x11	249
Mass Micro ColorSpace Fx	2499
Mass Micro ColorSpace IIi	1650
Orange Micro Personal Vision	2119
Passport MIDI Interface	73
Summagraphics Bit Pad +	319
Display	
Calcomp 21" 8-bit Color w/card	4699
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Emulation	
OrangeMicro Mac 286	call
OrangeMicro Mac 86	519
Soft PC with AT/EGA	369

HARDWARE

Mice/Keyboards	
A+ Optical Std or ADB	49/69
Abaton ProPoint	87
Advanced Gravis MouseStick	64
CH Rollermouse	75
CE Mac105 Keyboard	119
Datadesk Mac 101 Kbd	129
Datadesk Switchboard	161
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Keytronics MacPro	119

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Qume ScripTen	3195
Printer Interfaces	
Grappler LX	125
Freedom Of The Press	239
GDT JetLink Express	call
Scanners	
Abaton 300S	1090
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RS#	ADVERTISER	PAGE
N/A	Abaton Technology Corp.	66*
128	Abbott Systems	12
399	Abracadata.	306
N/A	Adobe	213
106	AEC Management	150
179	Aldus	193-195
71	AlSoft, Inc.	20
159	Altsys	156
N/A	Apple	191
N/A	Apple Developer Channels	258
64	Applied Engineering	132
194	Asante	163
3	Ashlar	126
136	Berkeley Systems	173
N/A	Berkeley Systems	68*
N/A	Bottom Line Distribution	299
49	CalComp	262
103	Casady & Greene, Inc.	177
104	Casady & Greene, Inc.	179
117	CDA Computer Sales	69-71
99	CE Software	28
N/A	CE Software	69*
193	Central Point Software	161
N/A	Claris	122
N/A	Claris	21-23
152	CMS Enhancements	165
26	Computer Associates/Bedford	98
19	Co-Star	244
20	Co-Star	245
185	Cutting Edge	C6
133	Dantz Development	152
146	DataViz	146
37	DCA	82-83
87	Deneba Software	5
86	Deneba Software	148
57	DesignCAD, Inc.	124
132	Dest	30
120	Diskette Connection	294
44	DPI	136
160	Dr. Mac	65-67
109	Dubl-Click	188
169	Eastman Kodak.	246
121	Eastman Kodak	175
197	Educorp	300
184	Ehman	C3-C5
154	EMAC	43
N/A	EMAC	65*
108	Engineered Software	152
175	Farallon	218
162	Fifth Generation	54
55	Fifth Generation	40
24	Fox Software	241
35	Franklin Software	42
N/A	Franklin Software	66*
353	GCC Technologies	49
101	GCC Technologies	50-51
102	GCC Technologies	52-53
6	Graphsoft	129
N/A	Hard Drives International	288-289
N/A	Hewlett-Packard	72-73
N/A	Hewlett-Packard	74-75
N/A	Hewlett-Packard	76-77
N/A	Hewlett-Packard	78-79
N/A	Hewlett-Packard	80-81
N/A	Image Club Graphics, Inc.	187
N/A	Image Club Graphics, Inc.	68*
N/A	IPT, Inc.	67*
147	Intergraph.	102
N/A	Intuit	27
157	Jasmine	265
171	Kensington	19
178	Kensington	169
94	Kinetics/Novell	171
122	Kin-tronics Systems, Inc.	308
90	Lasergraphics.	307
N/A	LaserMAX Systems	224
176	Liberty Systems	294
14	Lifetree Software, Inc.	31
N/A	MacAcademy	65*
N/A	MacAvenue	166-167
N/A	MacAvenue	202-203
N/A	MacConnection	248-257
15	Mac Express	287
77	MacFriends	225
76	MacFriends	16
74	MacFriends	14
75	MacFriends	18
78	MacFriends	209
50	MacLand	290-293
129	MacProducts USA	301
195	MacStore	189
153	MacWarehouse	271-281
N/A	MacWarehouse	220-222
N/A	MacZone	32-39
N/A	Magnavox	100
N/A	Maxcess, Inc.	67*
60	Metropolis Software	42
118	Microcom Software	173
31	MicroMat Computer Systems	152
91	Micron Technology	196
138	MicroNet	104
137	MicroNet	242
N/A	Microsoft	C2-1
N/A	Microsoft	90-91
368	Mirror Technologies	112-113
33	Mitsubishi	180-181
167	Mitsubishi	60
23	NewCo Technology	56
192	ON Technology, Inc.	63
N/A	Oracle	13
62	Orange Micro	26
32	Pacific Data Products	106-107
34	Pacific Data Products	109
168	Panasonic.	236
36	Paragon Concepts	150
79	Personal Training	15
68	PLI	142-143
N/A	Portfolio Systems, Inc.	69*
172	Programs Plus	182-185
125	Prometheus Products, Inc.	204
143	QMS	232
142	Radius.	6-7
73	Rainbow Technologies	260
150	Safeware	294
112	Salient	156
N/A	ScanCo	69*
N/A	Shiva	10
130	Sigma Designs	134
N/A	Software Innovations	66*
89	Software Security	154
164	Software that Fits	295-297
177	Sony Microsystems	58
30	Sophisticated Circuits	175
110	Spectrum Holobyte	156
65	Supermac	17
92	Symantec	24
N/A	Symmetry Software	65*
148	Synergy Software	175
82	T/Maker	159
N/A	Teknosys	67*
42	Tektronix	228
43	Tektronix	229
88	Teleware	247
40	Texas Instruments	130-131
173	Texas Mac Express	298
111	Third Wave Computing	286
N/A	TOPS	9
70	Total Systems	306

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350
351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450
451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500

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- ☐ a) Mac Plus
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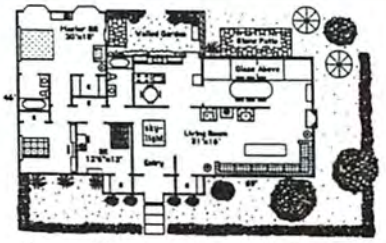
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MacUser MARKETPLACE

HARDWARE 310-319

BAR CODE 311
CD-ROM.....311
COMPUTER SYSTEMS 310-312
DATA ACQUISITION 312
DISKETTES.....312
DISK DRIVES 313-314
GENERAL 314-315
INPUT DEVICES.....316
INSURANCE 316
MEMORY UPGRADES 316-318
PERIPHERALS 319
PRINTERS 319
SECURITY.....319

SOFTWARE 319-325

ACCOUNTING 319
BAR CODE 319
BUSINESS 319-320
BUSINESS TIME MANAGEMENT.....320
DATA BASE.....320
DESKTOP PUBLISHING 320-321
EDUCATIONAL 321
EMULATION.....321
ENGINEERING.....321
ENTERTAINMENT/GAMES 322
FINANCIAL.....322
FUND RAISING 322
GENEALOGY 322
GRAPHICS.....322-323
HEALTH.....323
LANGUAGE TOOLS.....323
LOTTERY/GAMBLING 323
MEDICAL/DENTAL 323
MUSIC/MIDI 323
PUBLIC DOMAIN.....323
RELIGION 324
SHAREWARE 324
STACKWARE 324-325
STATISTICS.....325

MISCELLANEOUS 325-327

ACCESSORIES 325
DATA CONVERSION SERVICES 326
DESKTOP PUBLISHING SERVICES.....326-327
FURNITURE 327
INSURANCE 327
MAILING LISTS 327
SERVICES 327
SUPPLIES 327

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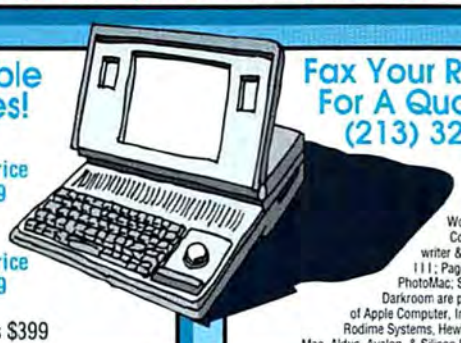
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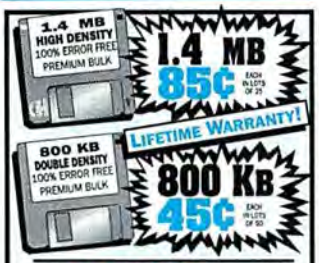
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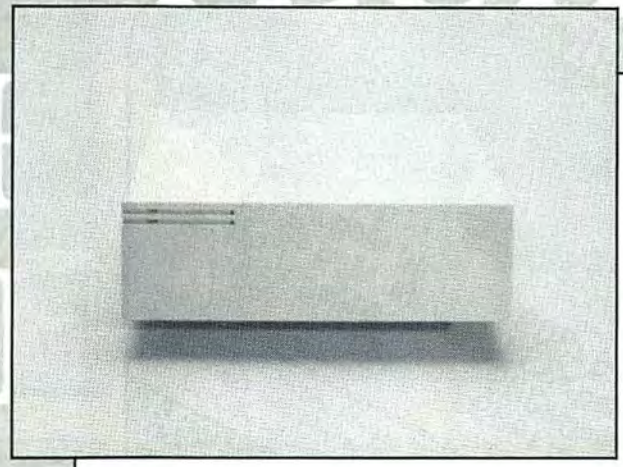
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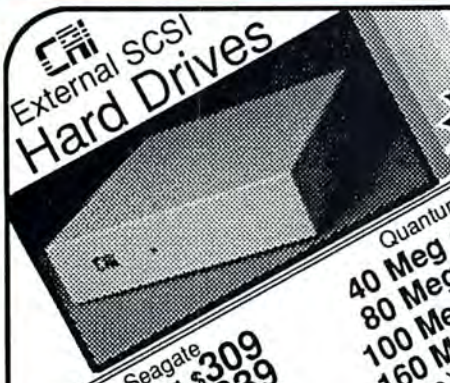
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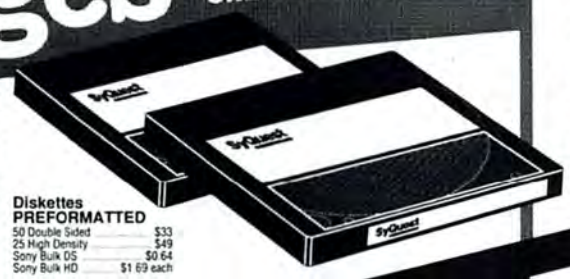
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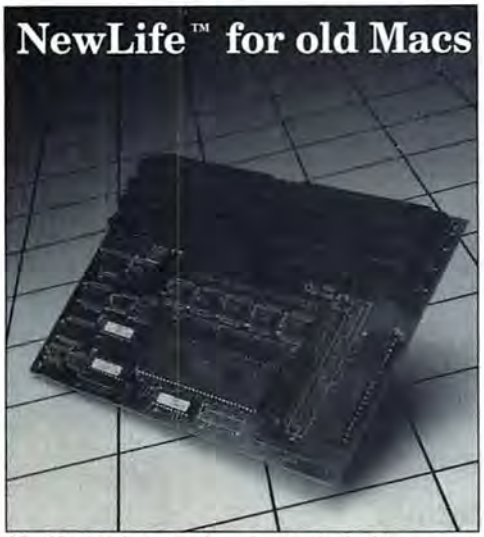
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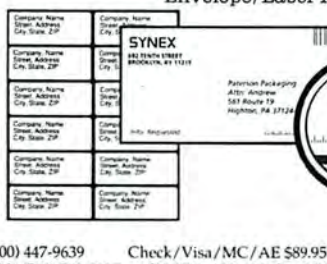
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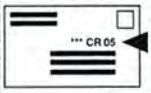
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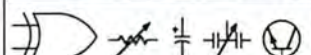
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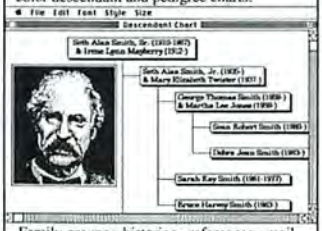
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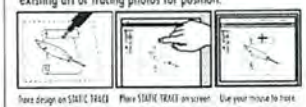
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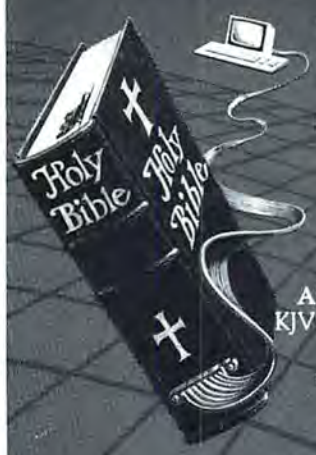
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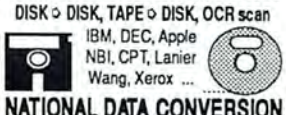
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Saturated Fads

Ideas come and go. Bad ideas never go away. The computer industry always has a few clinkers bouncing around. These are ideas for products that sound nifty to the naive but that are flawed through and through.

The all-time classic BS technology is the machine that "understands plain English." I have no idea how much money has been squandered on this scam in the last decade. It shows up over and over. The pitch is simple: You just type "simple English" commands. In reality, the commands are seldom simple and are only loosely based on English.

But that doesn't hold a candle to voice recognition as a major dud. Voice recognition is one of my favorites among dead-end technologies, and it has one of the most dubious futures as well. Over the last ten years, I've seen voice recognition tried over and over and over. I've seen people in soundproof booths. I've had people come over to my house to prove something works. It never does. At least not with any degree of reliability.

I call this technology dubious because even if it did work, what would it be used for? The most used command is "delete, delete, delete." Do we want an office full of people talking to their computers? How distracting can you get? Besides that, there'll always be one guy with a big booming voice and his commands would end up on your machine. "Erase the hard disk!?!? No!!"

One company came up with a game machine years ago based on voice recognition. The machine could recognize (barely) "up," "down," "left," "right," and "shoot." It wasn't bad enough that kids were hogging the TV set with a game computer — now they were shouting at it too. Bad idea.

The worst part about current implementations of voice recognition is that the machine has to be "trained." You have to manually verify command after command until it gets used to your voice. Catch a cold, and you're out of luck.

Voice recognition is a lot like the next fad I see coming: stylus- or pen-based computing. This is a real lulu. This fad may have started with the GridPad, a machine with a flat screen and a pen you could use like a pointer to mark on the pad. The ultimate representative of this category seems to be the GO machine, currently being developed in California. It's supposed to read handwriting and be able to turn it into ASCII text. You just write on the pad instead of typing on a keyboard.

No more speedy typing, folks — let's use slow handwriting instead. Does this sound like a good idea? This is a backward technology. It appeals to the Neanderthals who can't even hunt and peck on a keyboard. "There are 25 million nontyping executives who would buy this device," I was told by a ranting apologist for the idea.

I thought to myself, 25 million? Man, that's a lot of dumb executives. Worldwide even, that's still a lot. Well at least these developers think big. I'm reminded of the Gavilan portable and the Mindset and Dynabook computers. All machines with a better idea and a huge perceived market. All flopperoos.

Well, before I get too cruel, let's go through the point-by-point reasons such a technology will never succeed:

1. It's counter to a major societal trend: computer literacy. Most 12-year-olds nowadays can use a keyboard. Why develop something for a dying breed of people who can't use a keyboard? It's a bottom-feeder technology. It reminds me of the fad a few years back to develop word processors for people who didn't like computers. It's like designing a car for people who can't drive.

2. It's counter to a major cultural trend — flawed penmanship. While people can use keyboards, few can write well. In fact, in the past few decades, typical penmanship has deteriorated to the point of illegibility. Suddenly computers are expected to read this gibberish when they could never read even good handwriting in the past. This is not an insignificant problem. I'm told that the new algorithms for reading handwriting are fabulous. But as a heavy user of OCR — optical character recognition, used for scanning typed and typeset text — I can tell you that this simpler technology still has too many problems; even the best systems aren't close to perfect. How technology designed to read handwriting is supposed to somehow leapfrog OCR technology is a mystery to me. The word *crock* comes to mind.

3. What are the applications? Is this technology really better than a sheet of paper for transcribing notes? It can't be used to write columns. I can't imagine writing large articles without risking writer's cramp. As for those 25 million executives who can't type, I suspect they'd still rather dictate directly to a secretary than pass a computer pad with scribblings on it back and forth.

4. It has the earmarks of a yuppie toy. Enough said.

Now it's possible that some applications will thrive on such a machine. I admit that any kind of software that requires you to check boxes might work with this technology. A box would appear on the screen, and you'd write an *X* in the box with the stylus. I assume they are doing something about the potential for scratches on this thing; it would seem that a machine like this would easily get all scratched up. The stylus gets a little burr, and suddenly there's a gouge in the screen. Maybe the screen is made of quartz.

Someone suggested that a programmable check-box computer would be handy as a pilot's checklist for a 747. Instead of printing all those costly sheets of paper (golly, they must spend ten bucks a year for checklist printing), the pilots could have this computer in the cockpit. Yeah, there's a big market there.

One thing's for sure: As with voice recognition and the computer that knows simple English commands, there will be a lot of hype when these devices are released. I just look at my own chicken-scratch handwriting and laugh.



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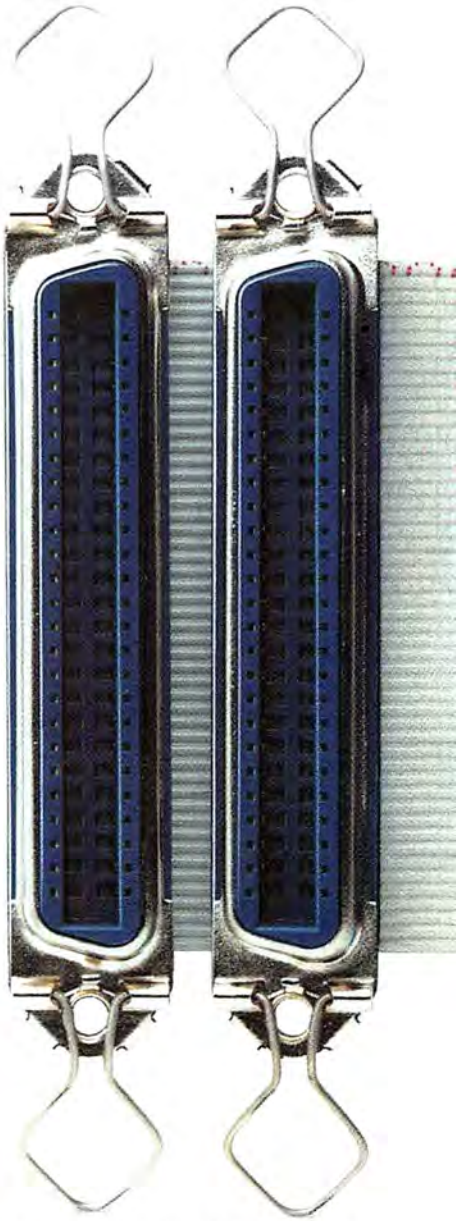
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